



(12) **United States Patent**  
**Bradford et al.**

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(54) **CONTAINER HAVING DUNNAGE COMPONENTS MOVABLE IN OPPOSITE DIRECTIONS**

2519/00338 (2013.01); B65D 2519/00502 (2013.01); B65D 2519/00567 (2013.01); B65D 2519/00621 (2013.01); B65D 2519/00666 (2013.01);

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(Continued)

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(58) **Field of Classification Search**

CPC .. B65D 81/05; B65D 19/0028; B65D 19/18; B65D 19/385; B65D 19/44; B65D 19/38; B65D 19/40; B65D 2519/00034; B65D 2519/00069; B65D 2519/00174; B65D 2519/00273; B65D 2519/00288; B65D 2519/00338; B65D 2519/00502; B65D 2519/00567; B65D 2519/00621; B65D 2519/00666; B65D 2519/00796; B65D 2519/00815; B65D 25/06; B65B 5/10; B65G 65/00

See application file for complete search history.

(21) Appl. No.: **14/605,175**

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(65) **Prior Publication Data**

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**Related U.S. Application Data**

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(51) **Int. Cl.**

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**B65D 25/06** (2006.01)  
**B65D 19/38** (2006.01)

(Continued)

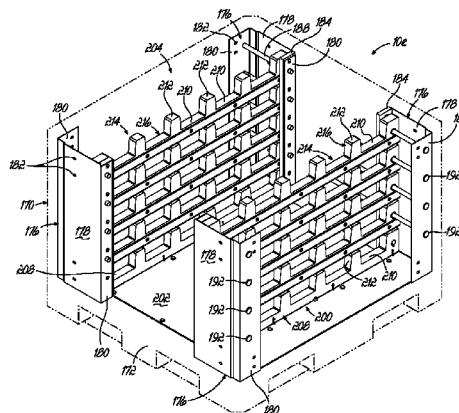
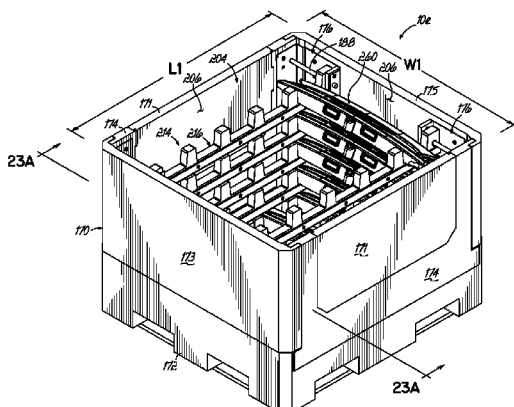
(57) **ABSTRACT**

A container for holding product therein during shipment and being returned for reuse has a base and opposite sides. The container has multiple levels of dunnage components, the dunnage components of at least one level being movable between open and closed positions to enable an operator to load and unload products more easily. The dunnage components of at least one level may have openings through which pass guides supported at least partially by the container.

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**25 Claims, 47 Drawing Sheets**



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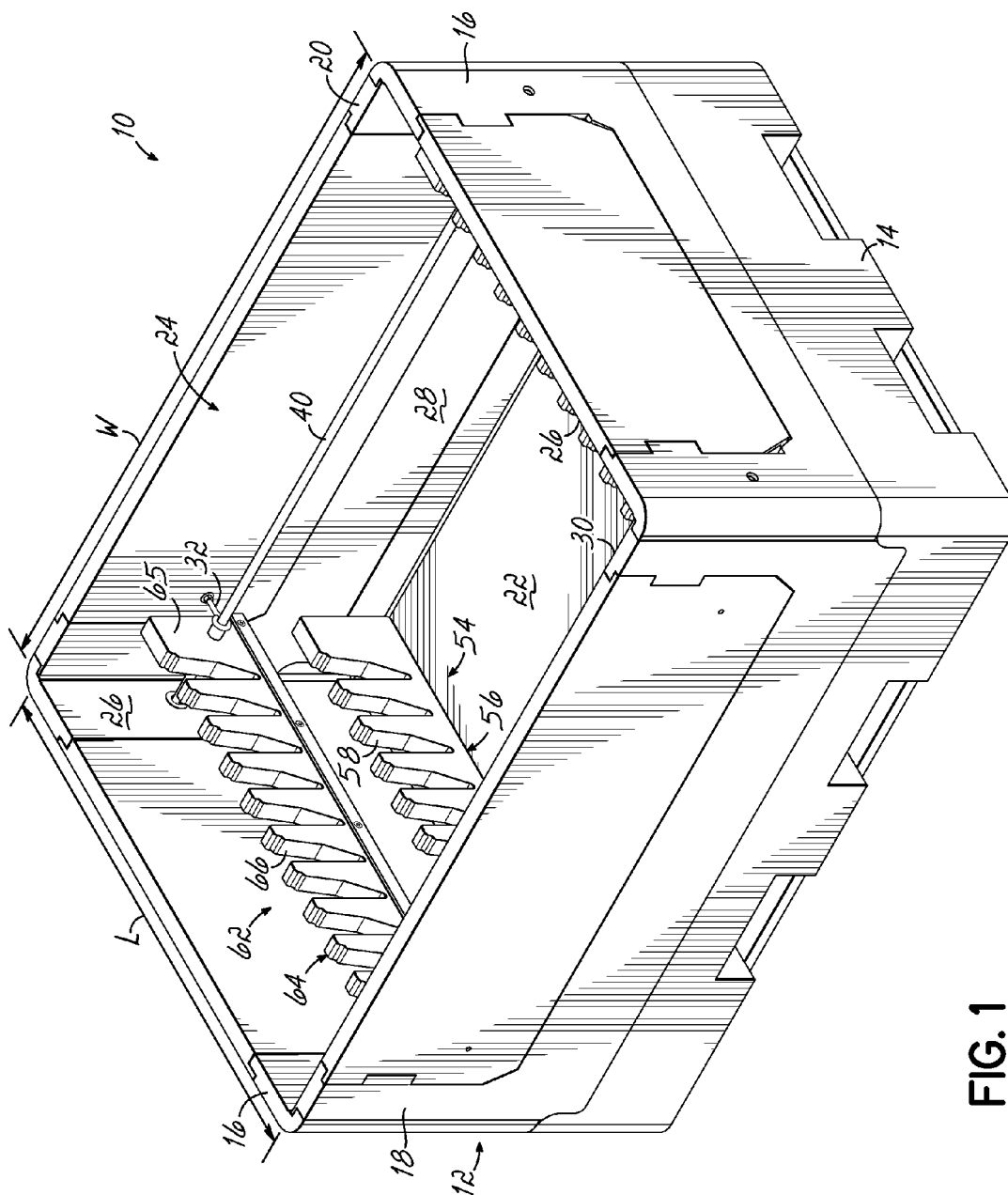


FIG. 1

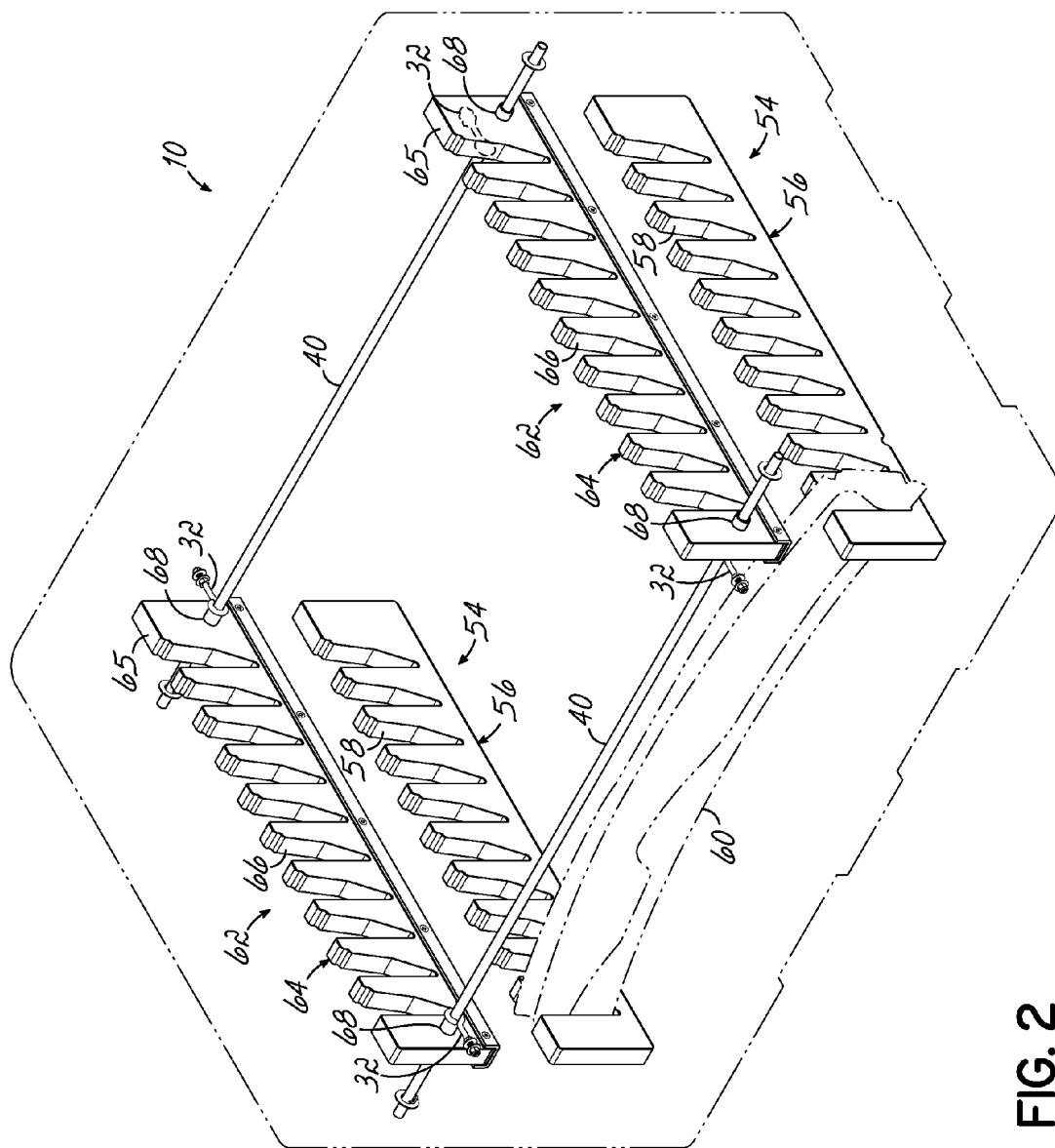
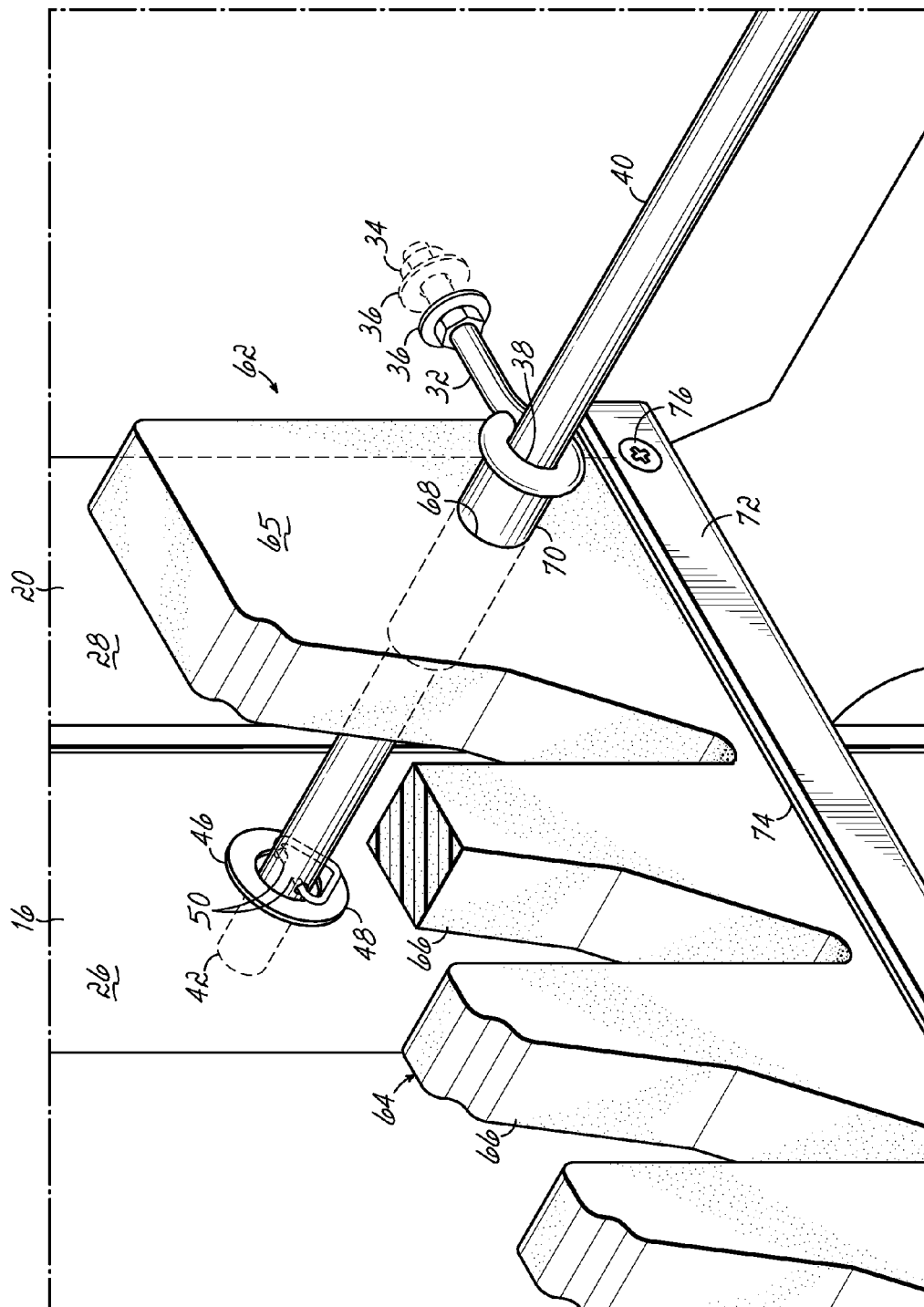


FIG. 2



**FIG. 3**

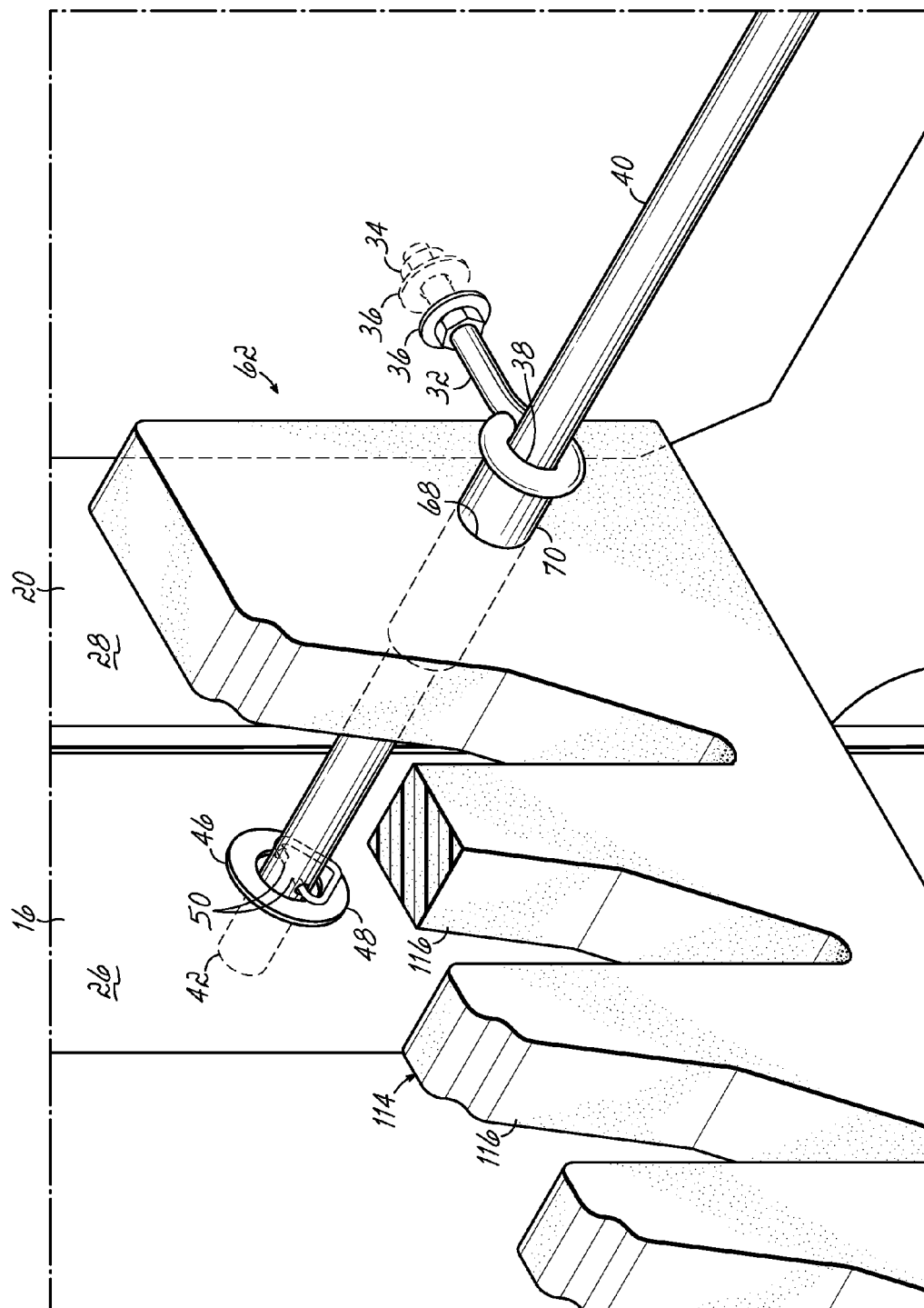


FIG. 3A

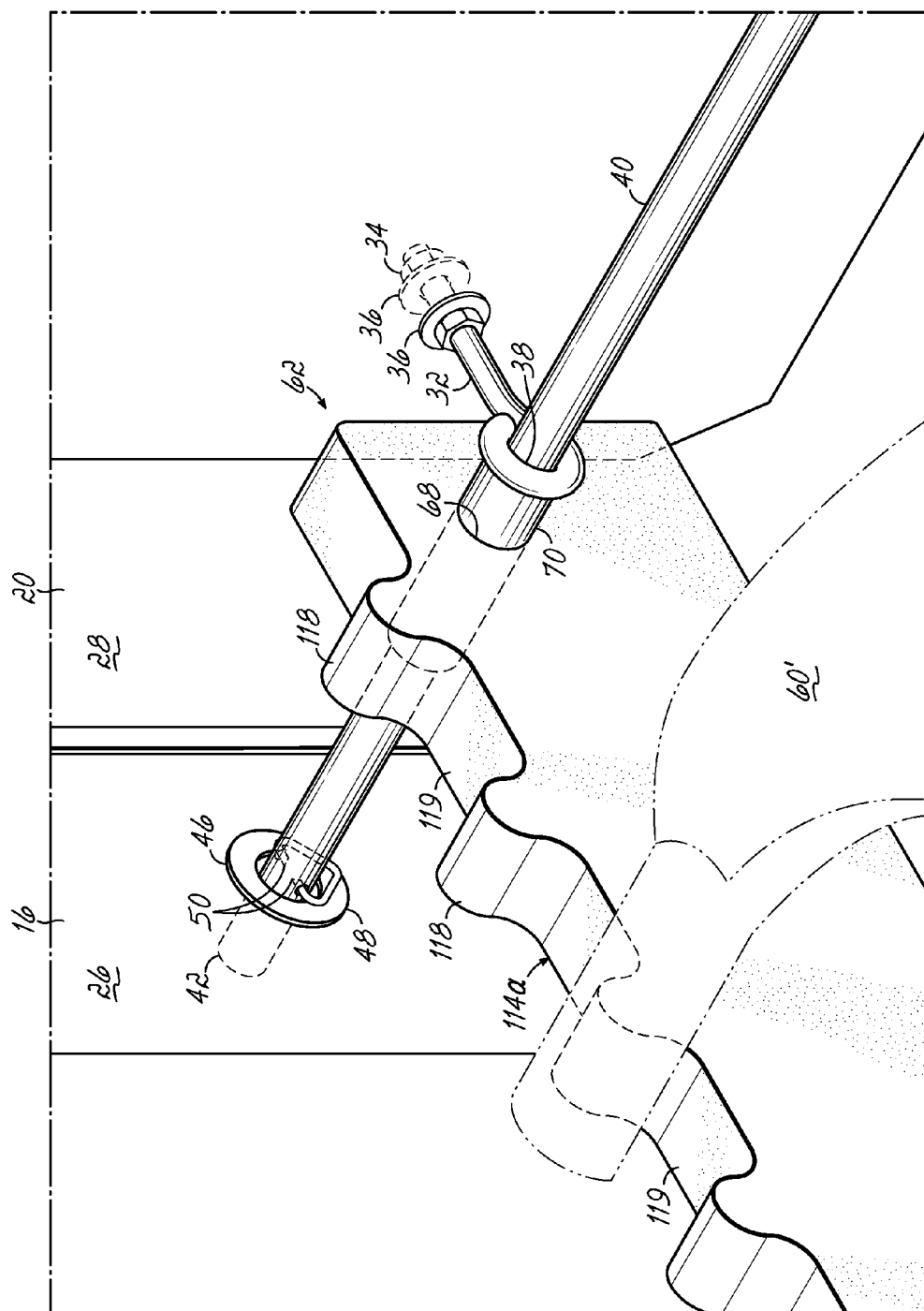


FIG. 3B

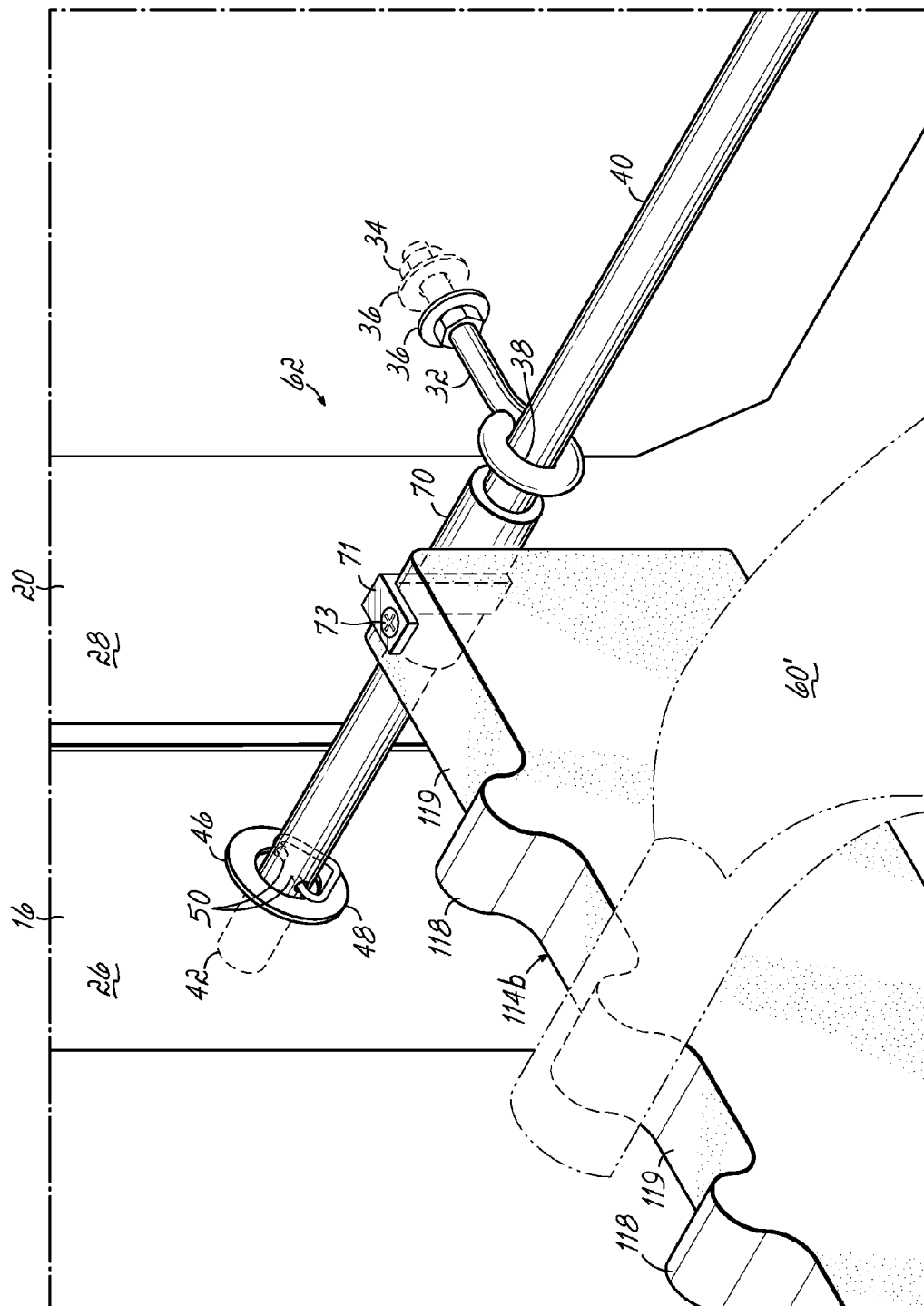
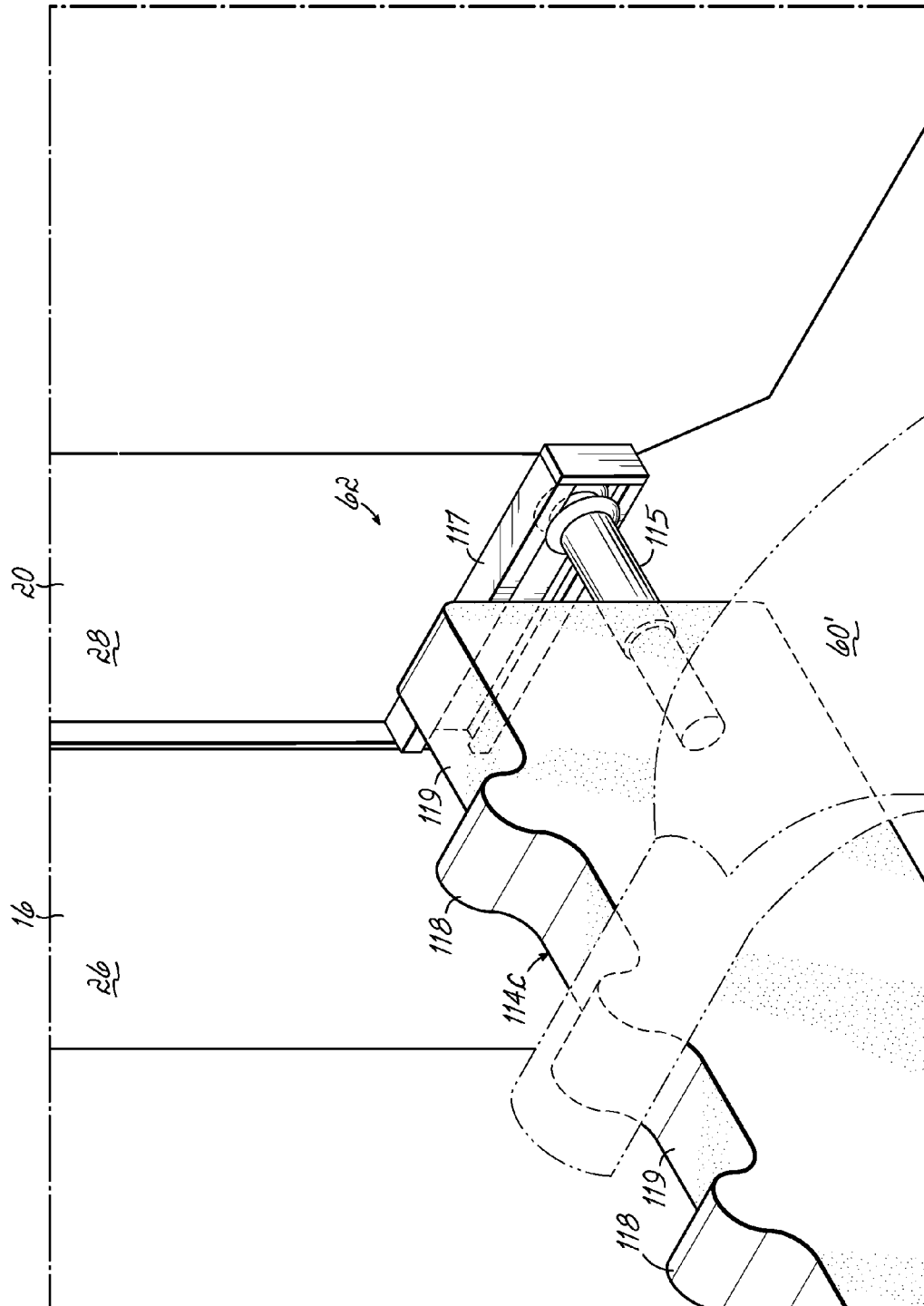


FIG. 3C





**FIG. 3D**

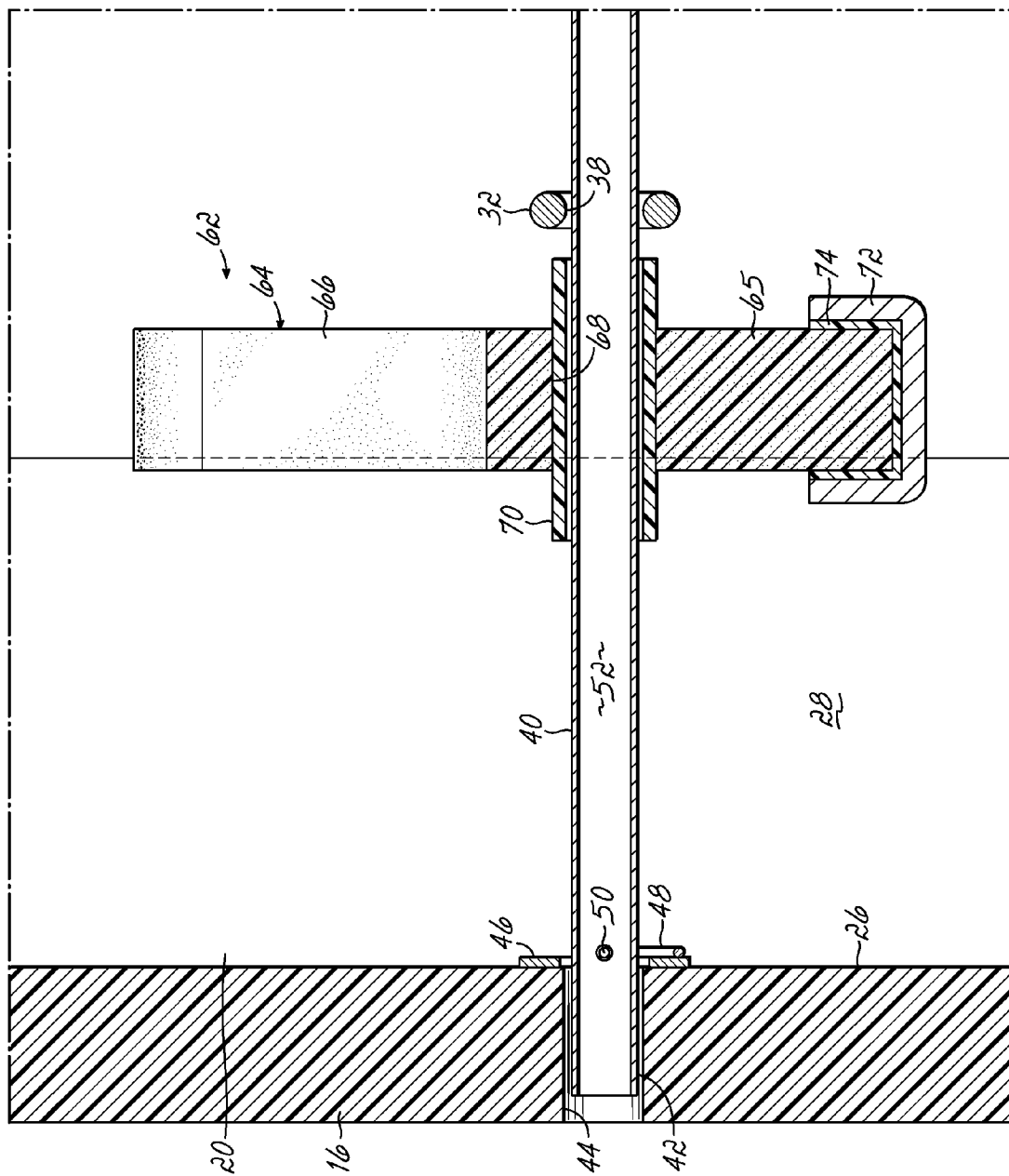


FIG. 4

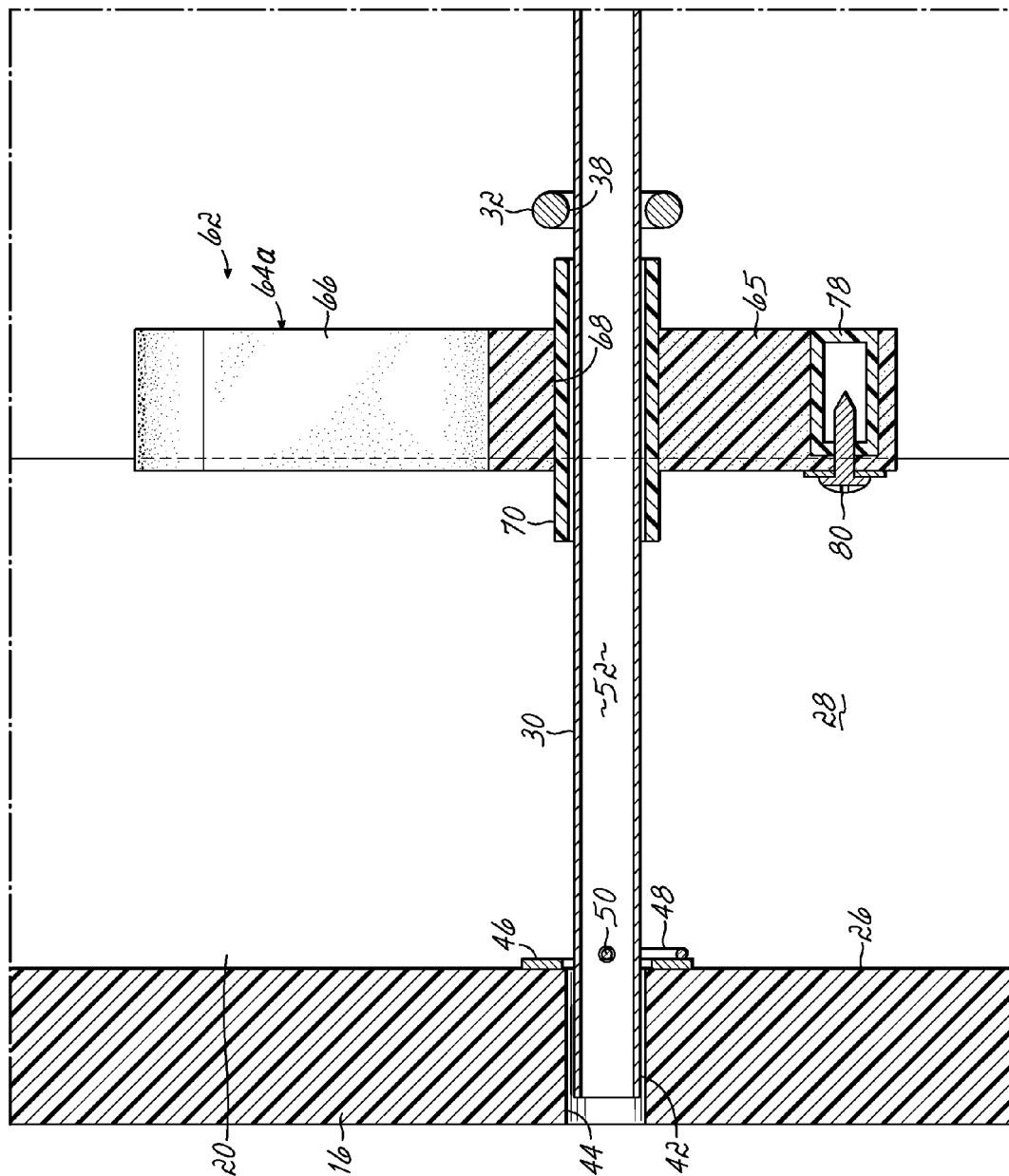
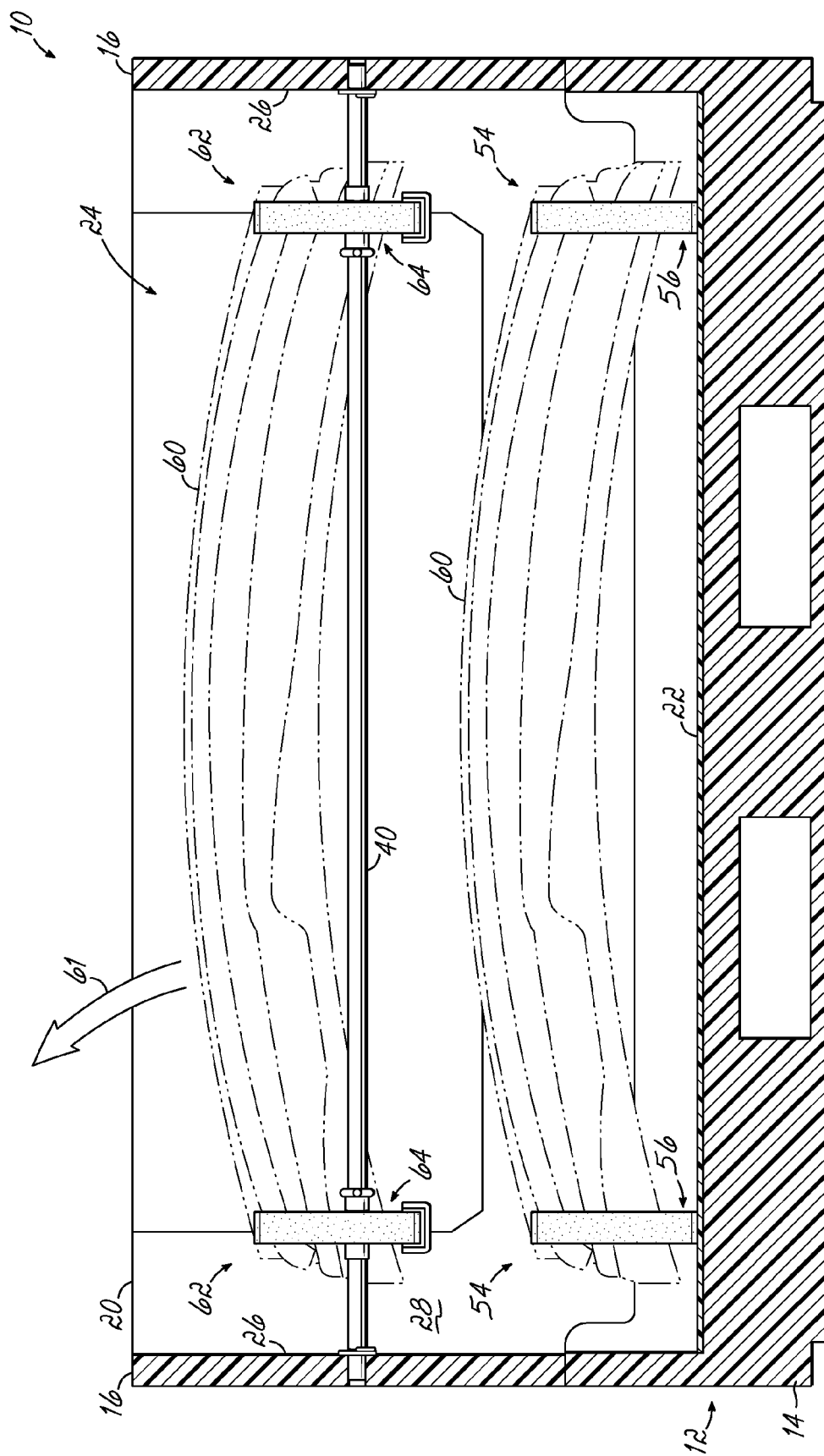
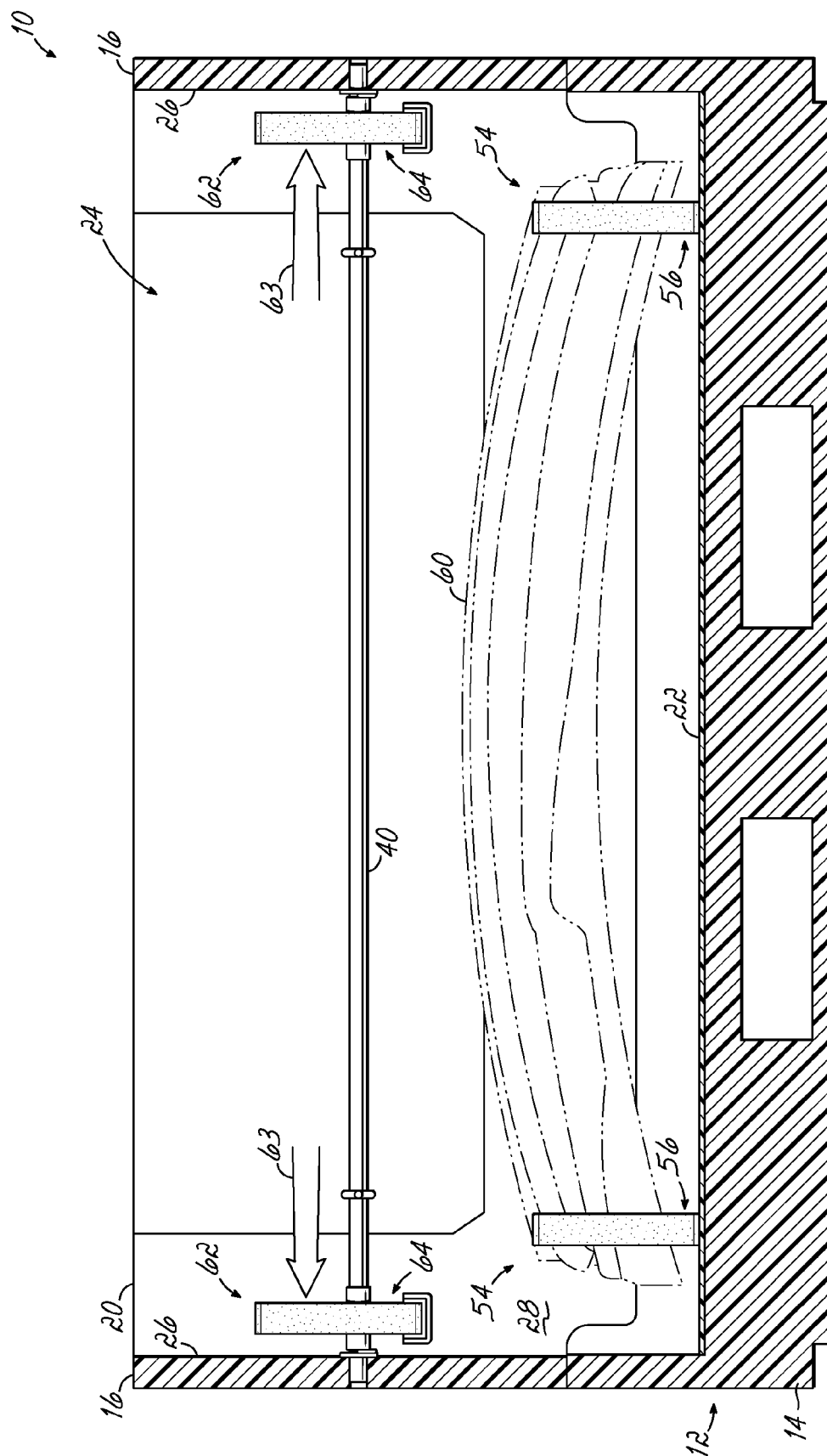


FIG. 5



**FIG. 6A**



**FIG. 6B**

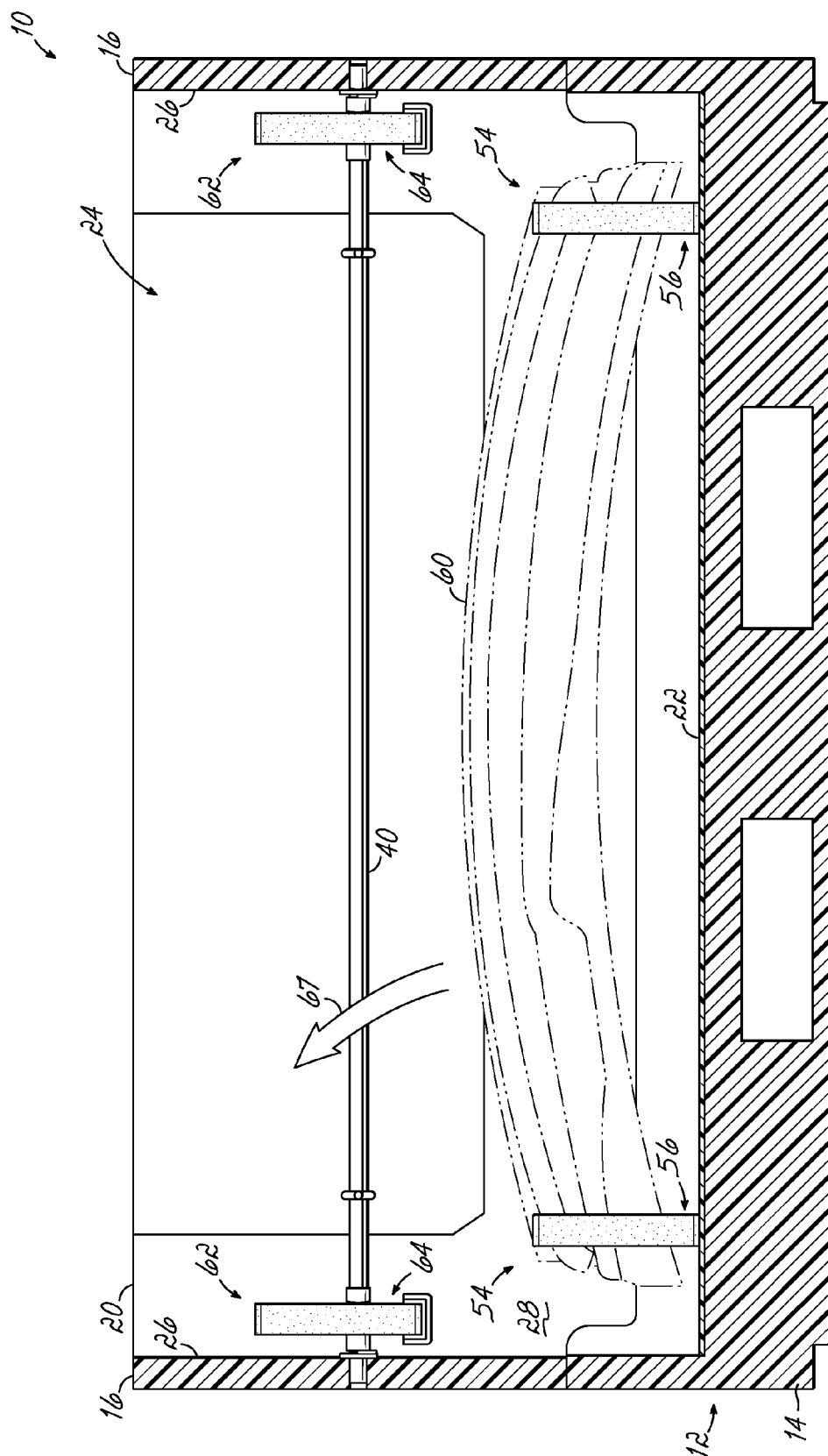


FIG. 6C

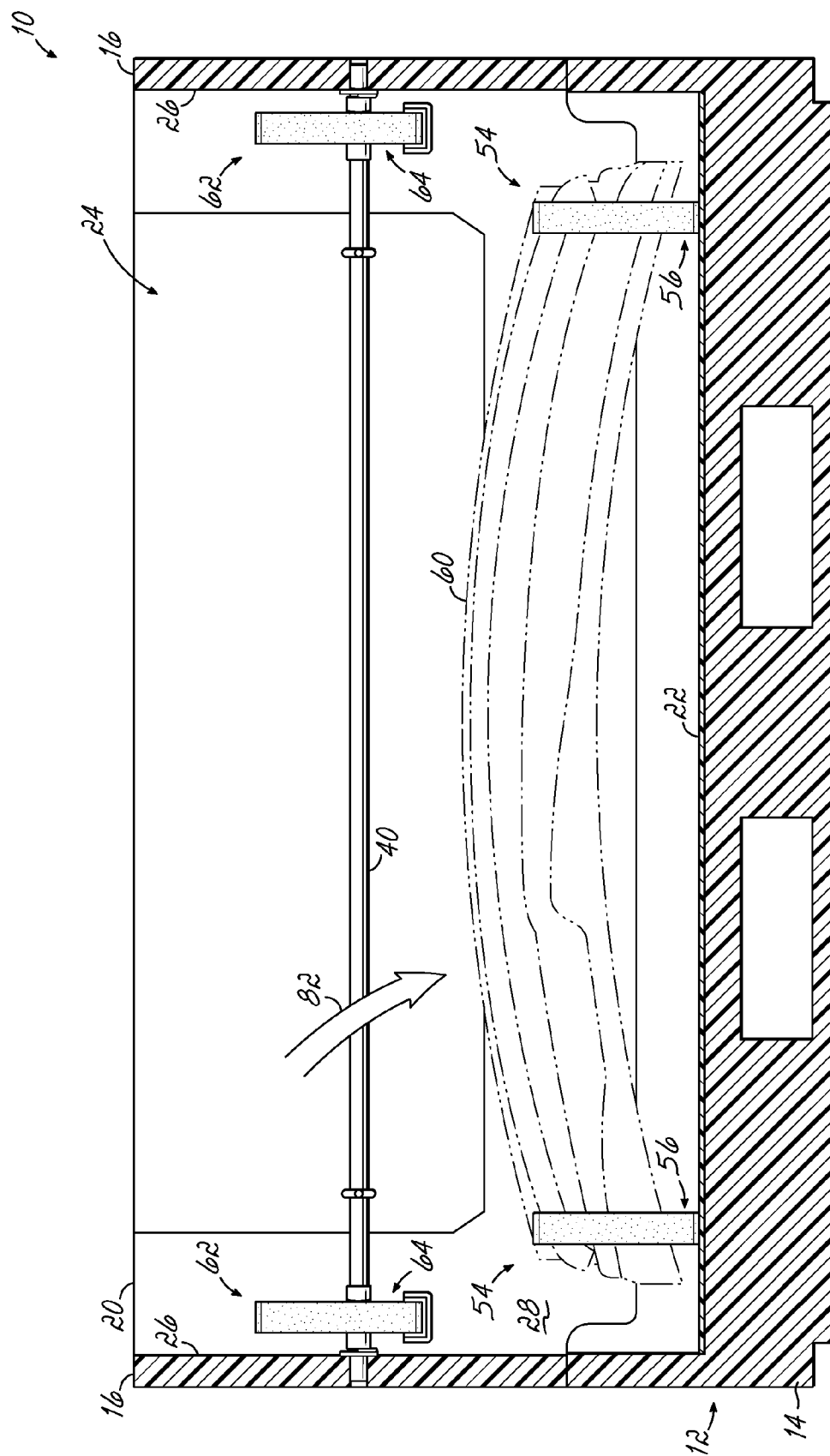


FIG. 6D

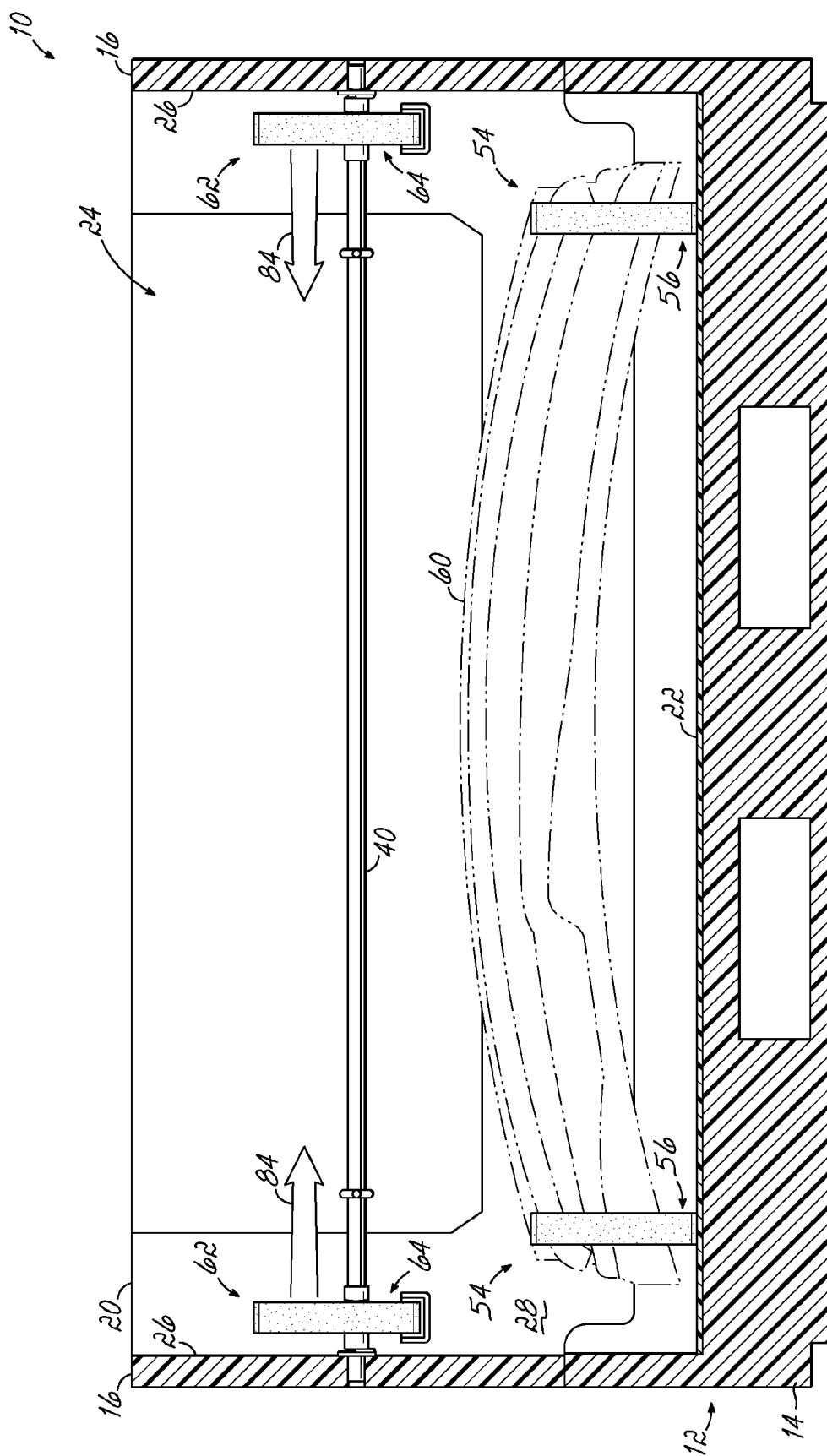


FIG. 6E



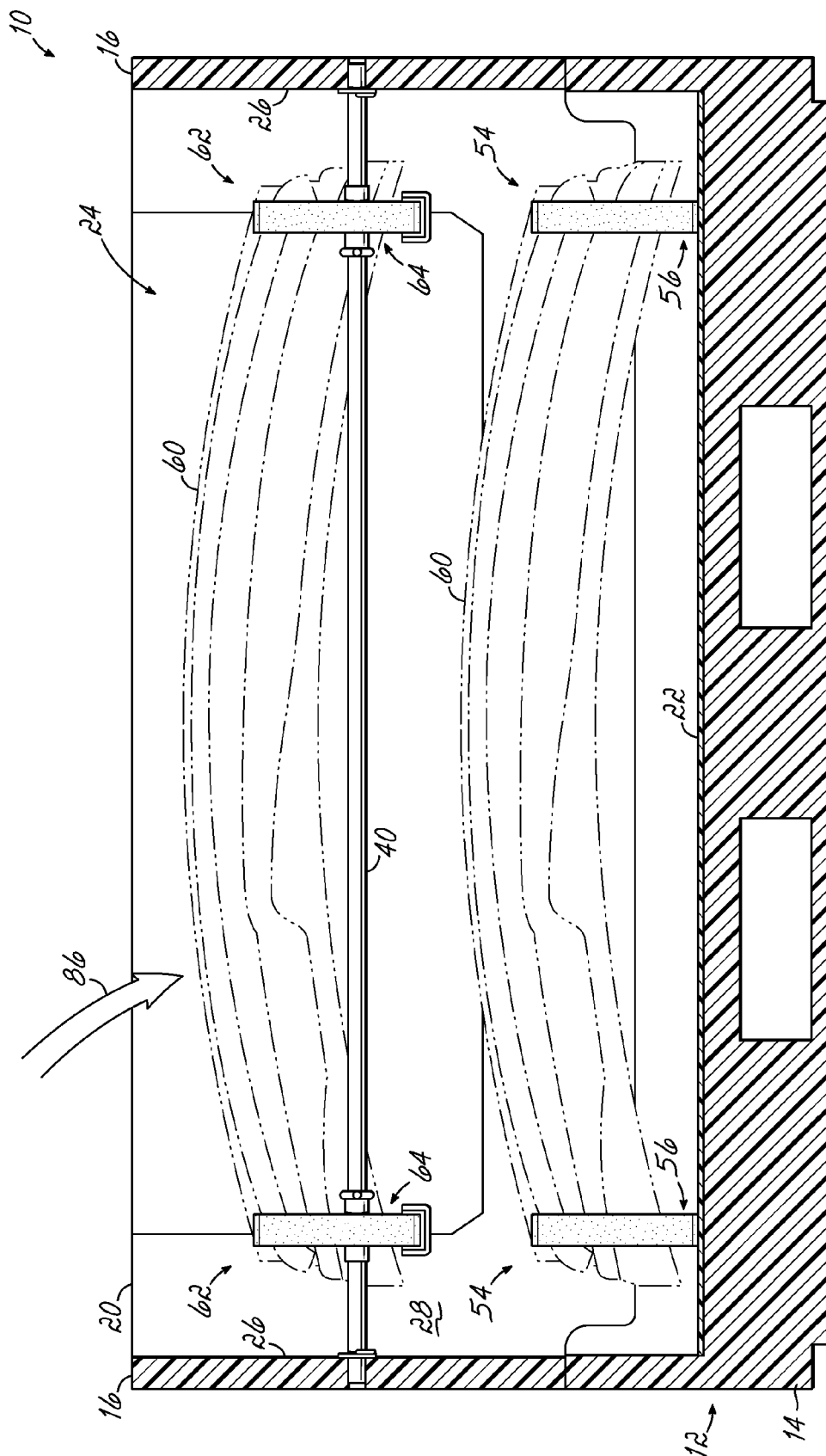


FIG. 6F

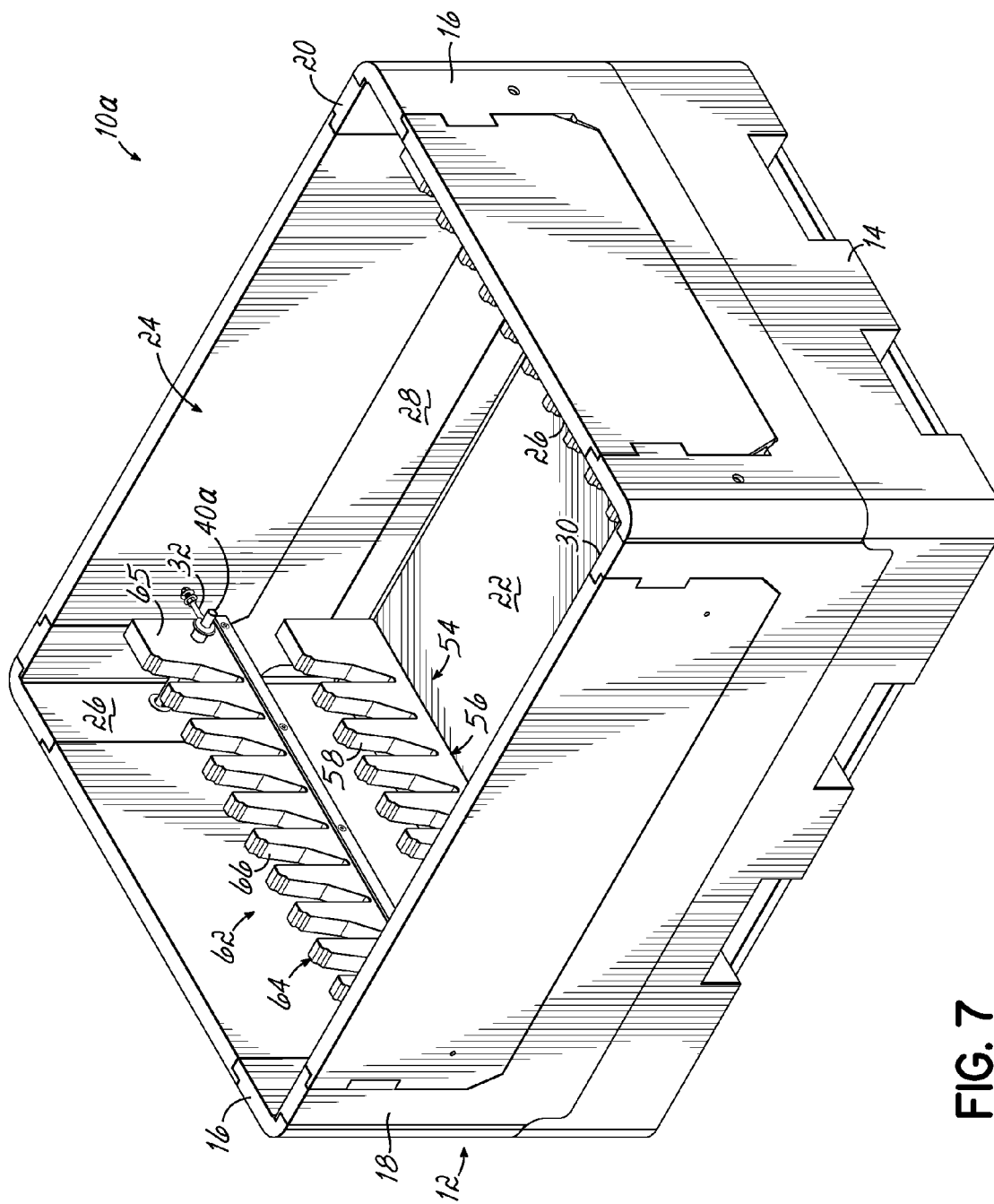


FIG. 7

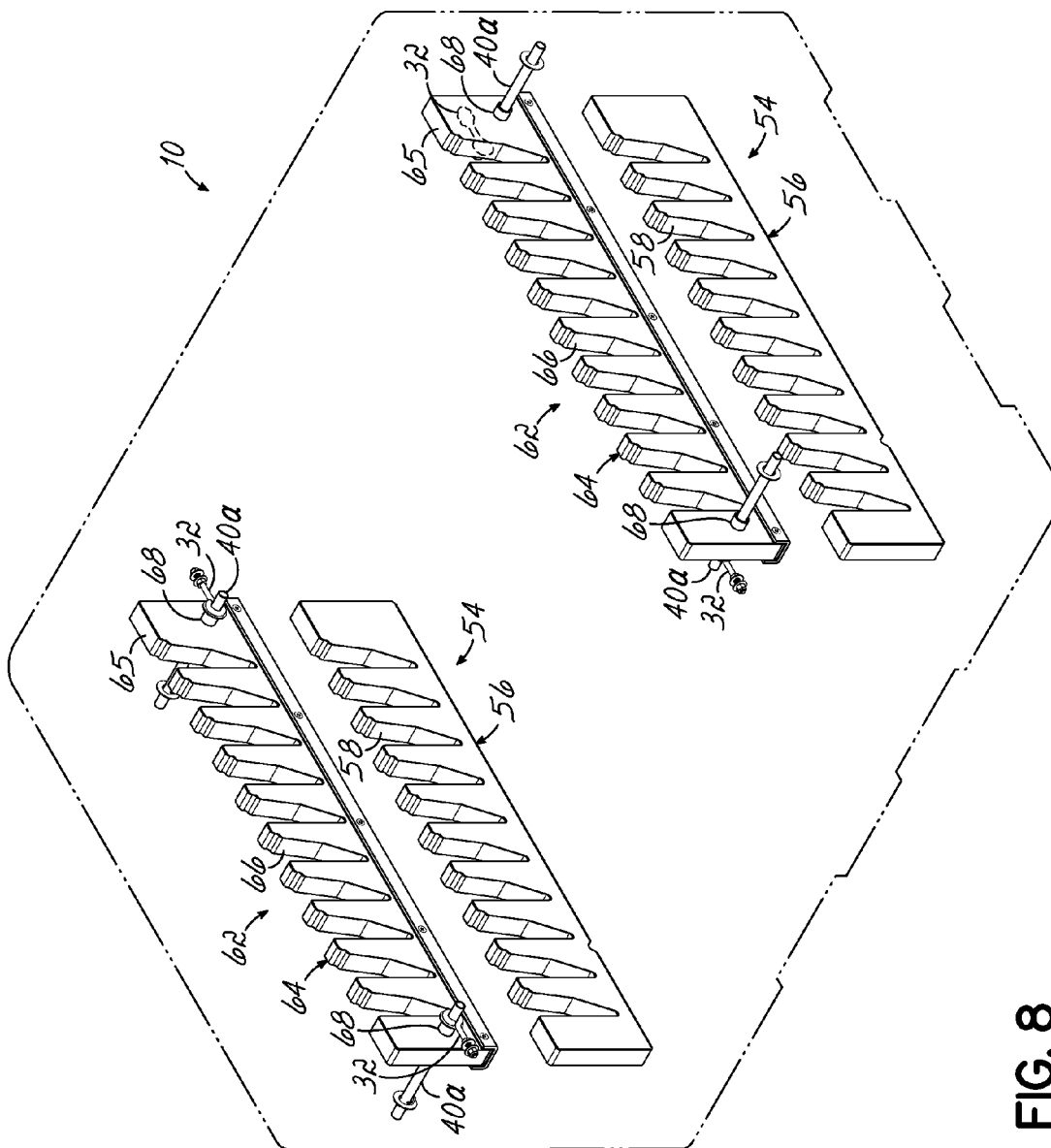
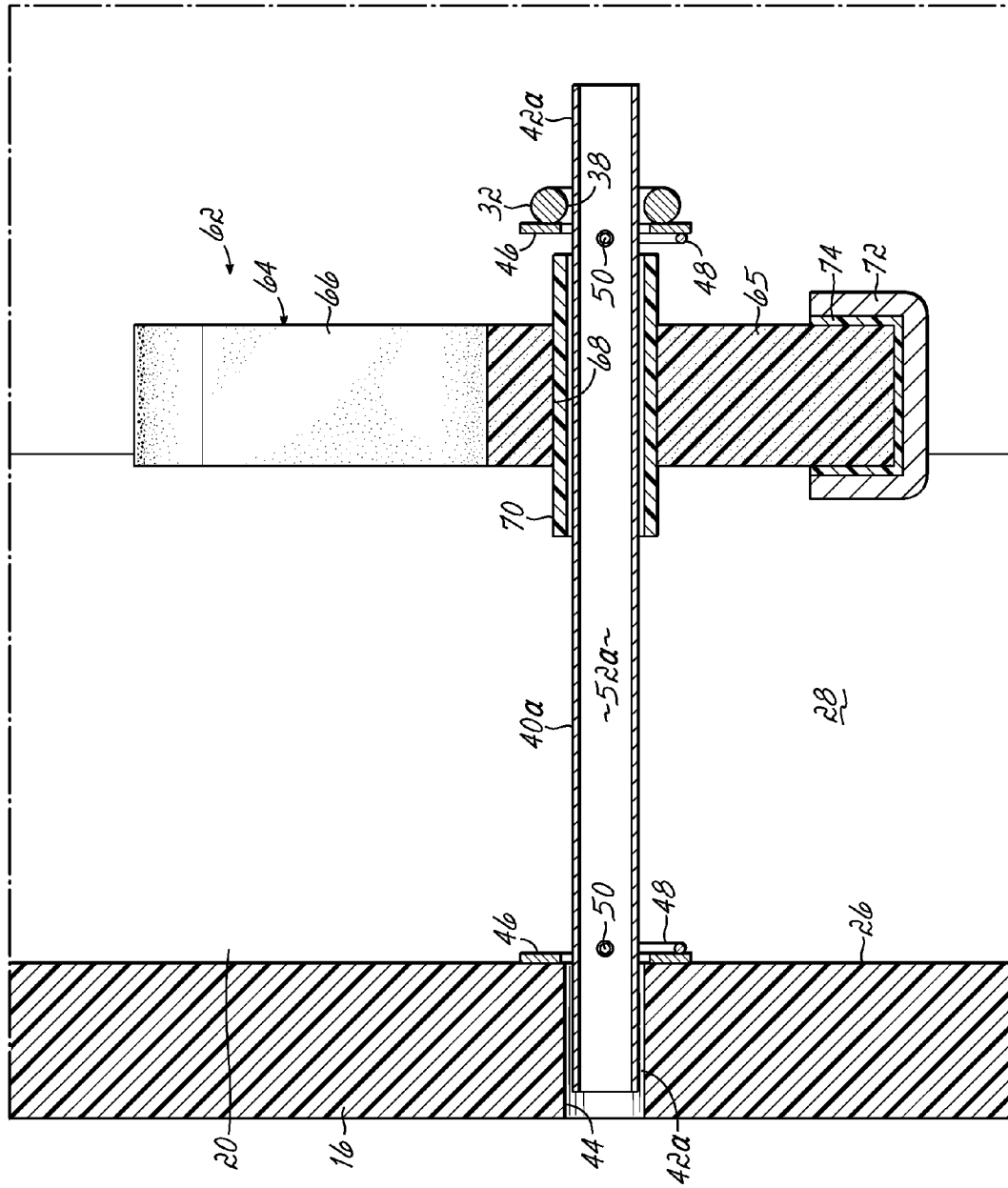
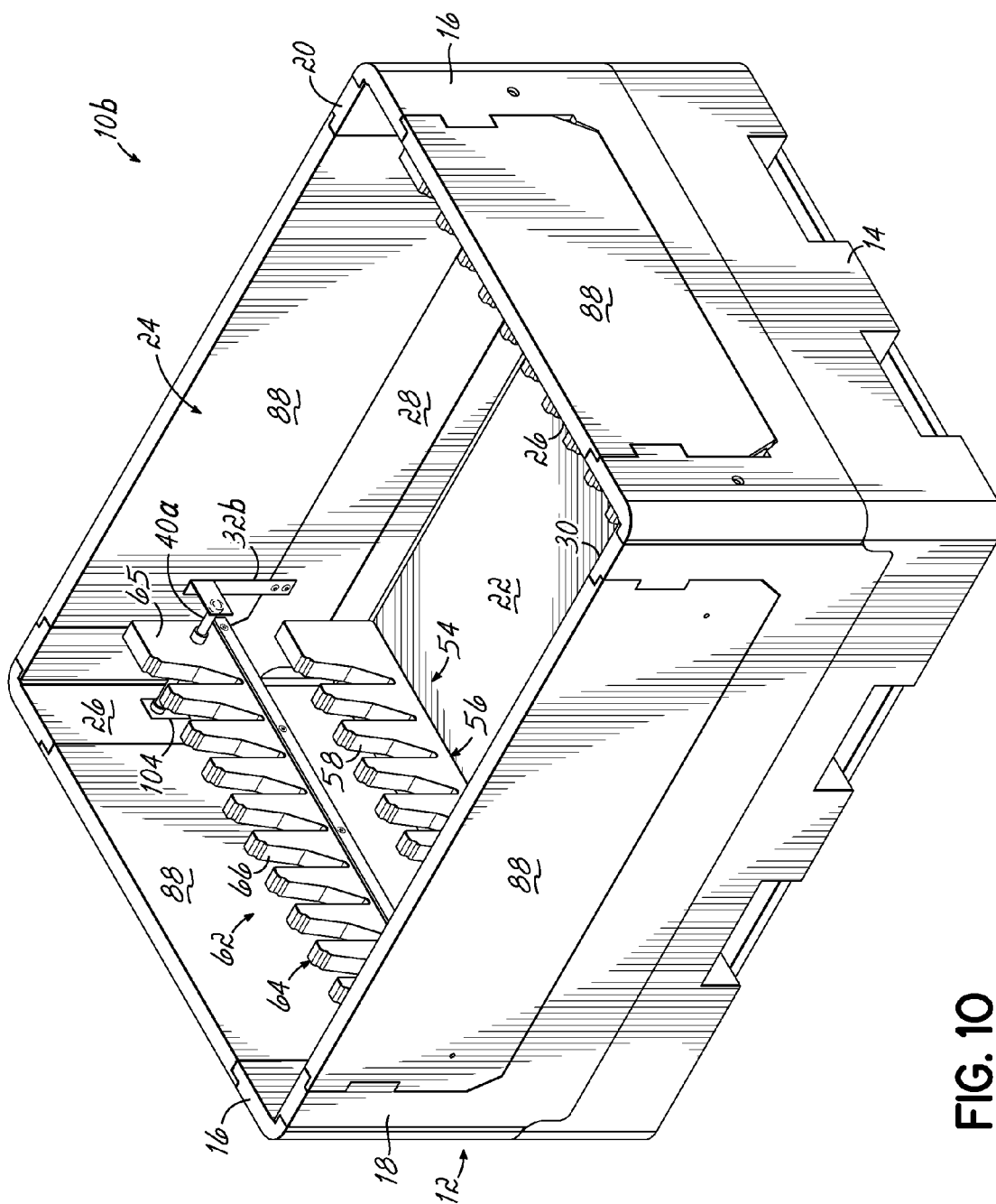


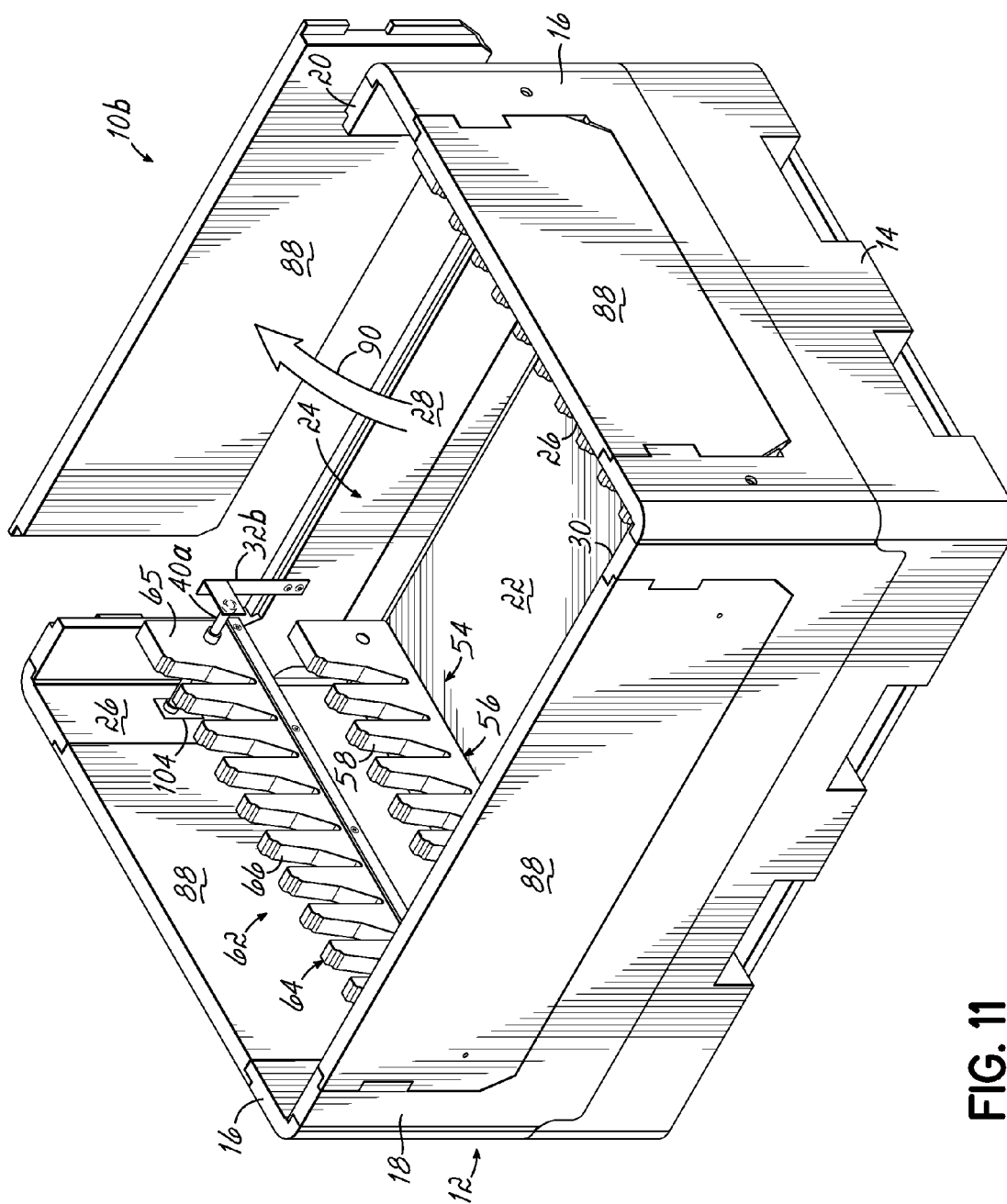
FIG. 8



**FIG. 9**



**FIG. 10**



**FIG. 11**

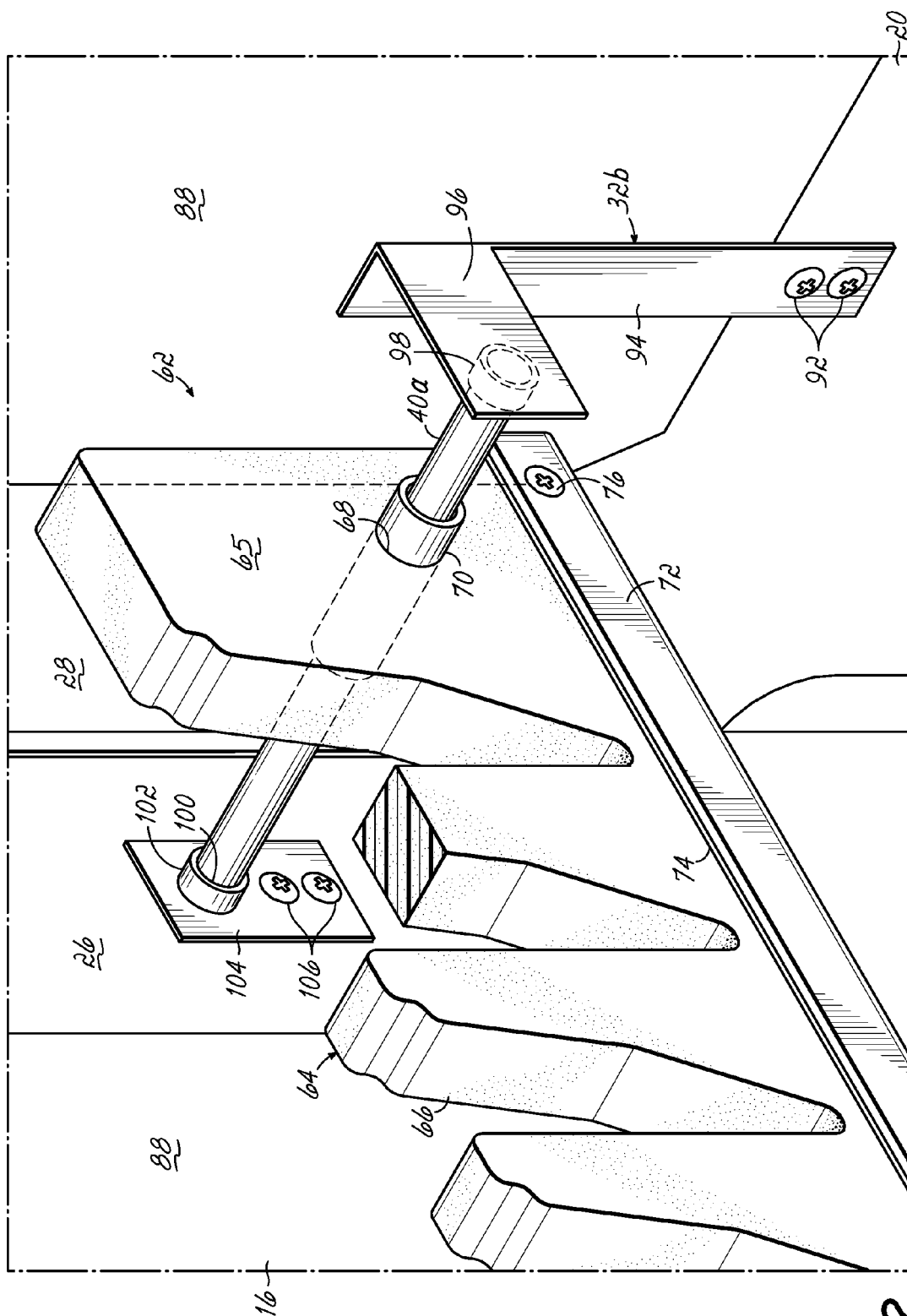


FIG. 12

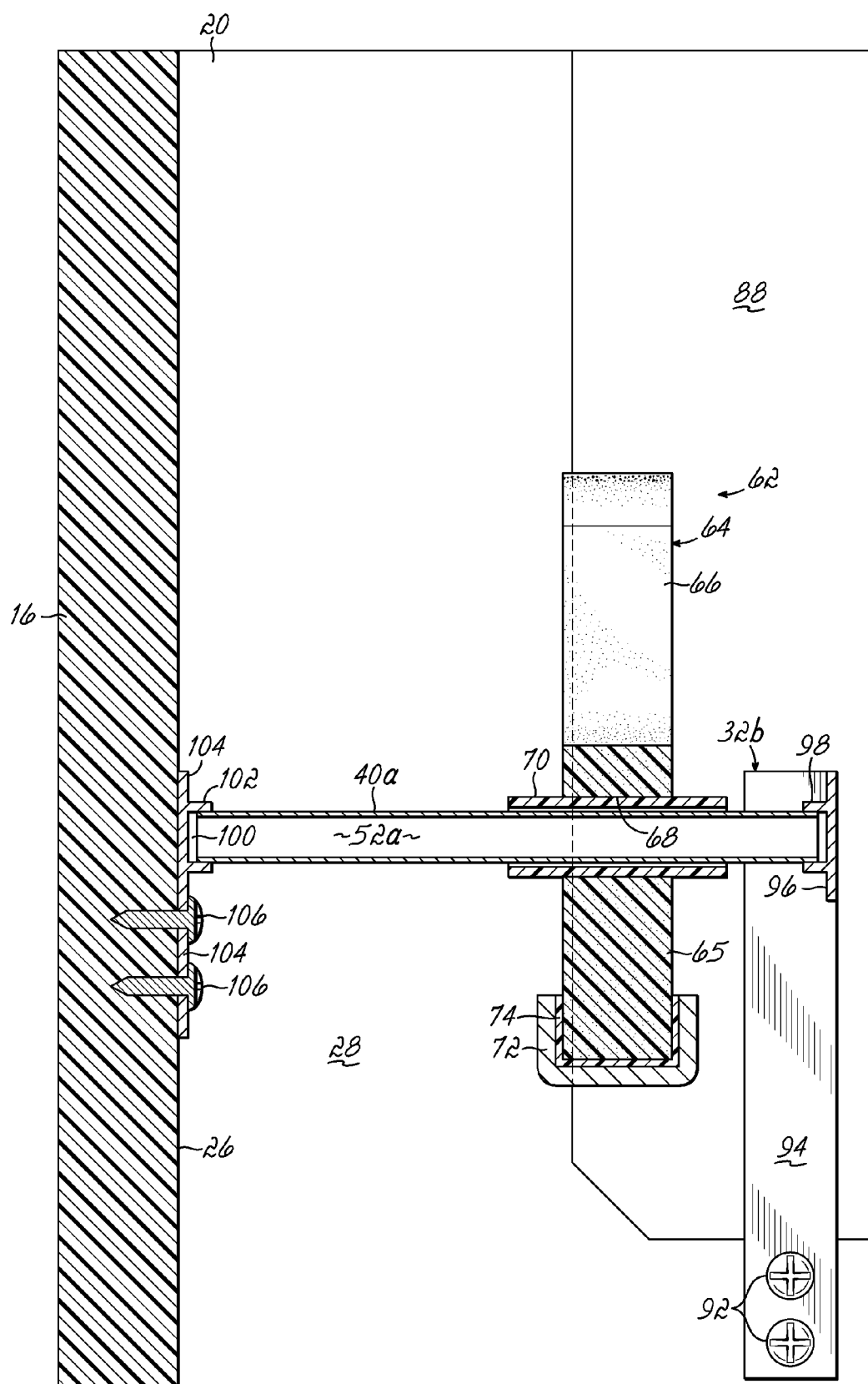


FIG. 13



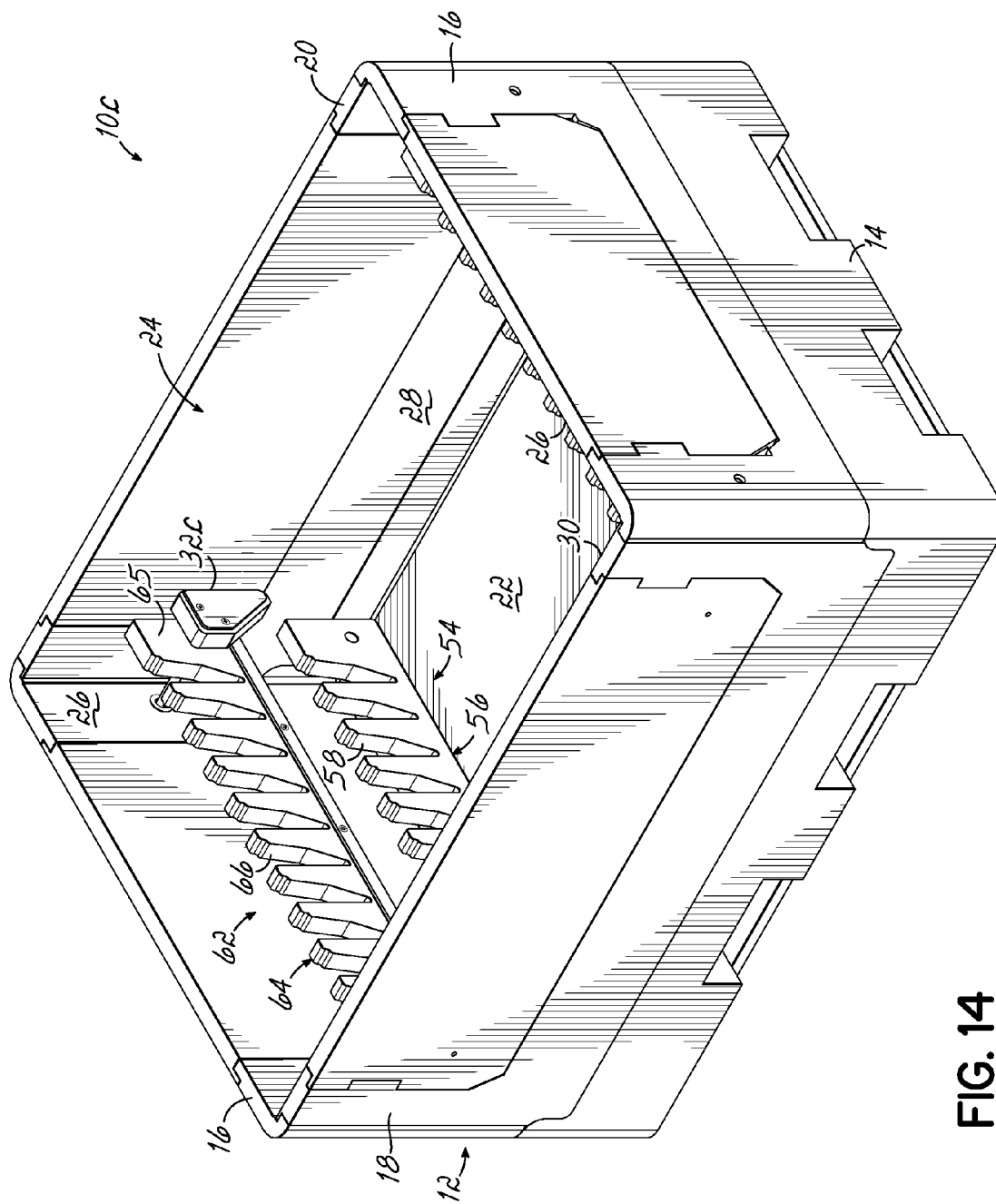
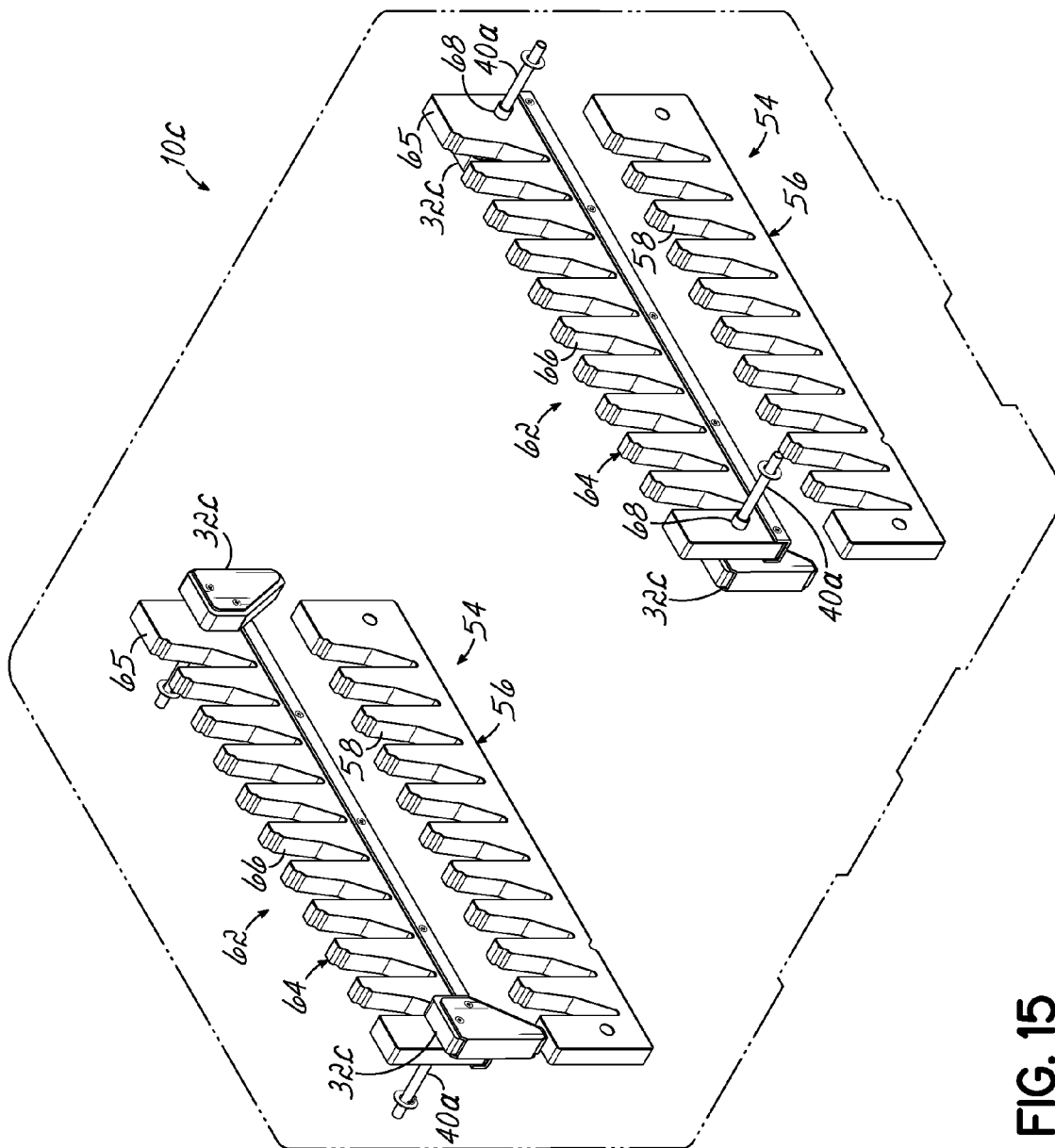


FIG. 14



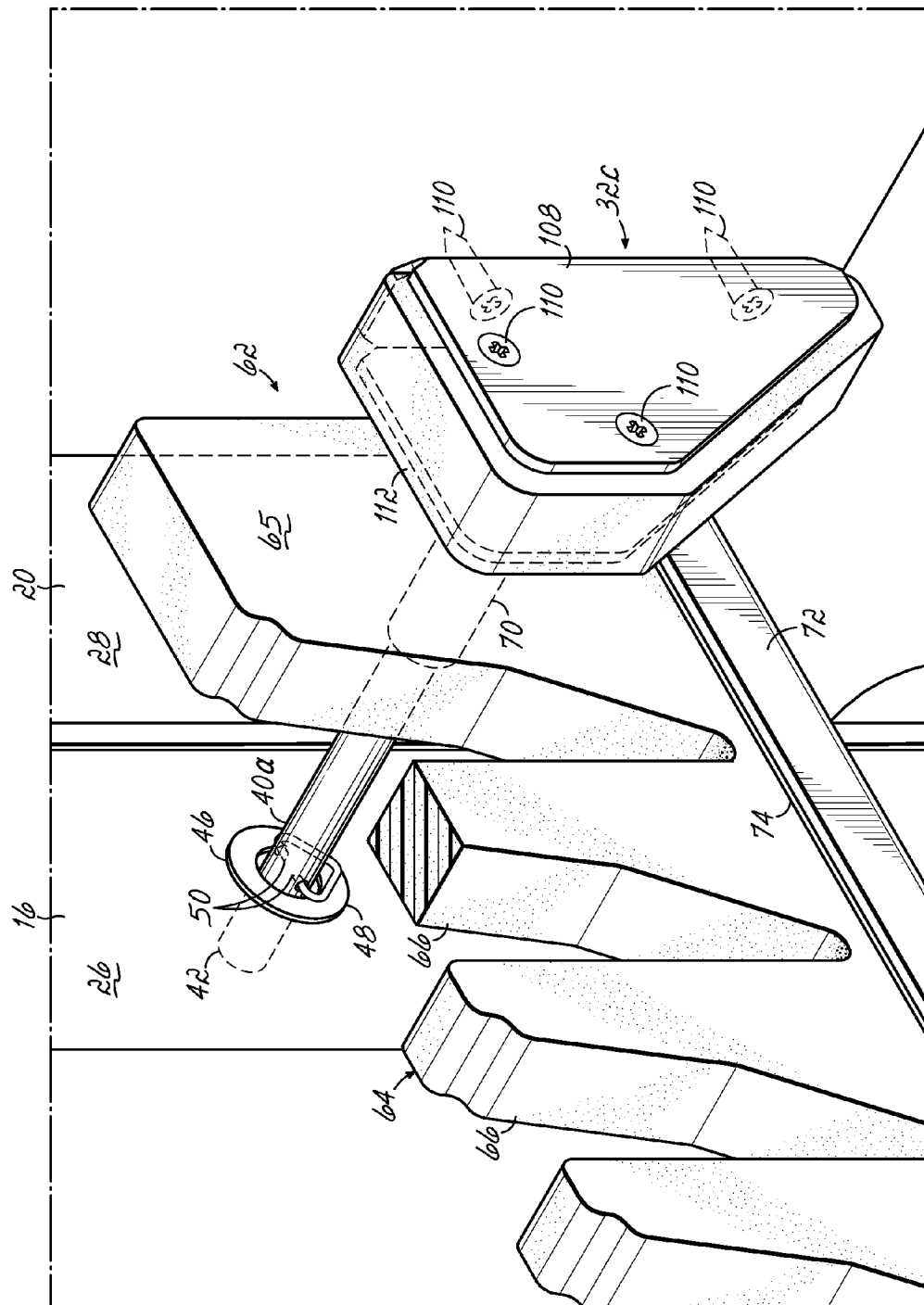


FIG. 16

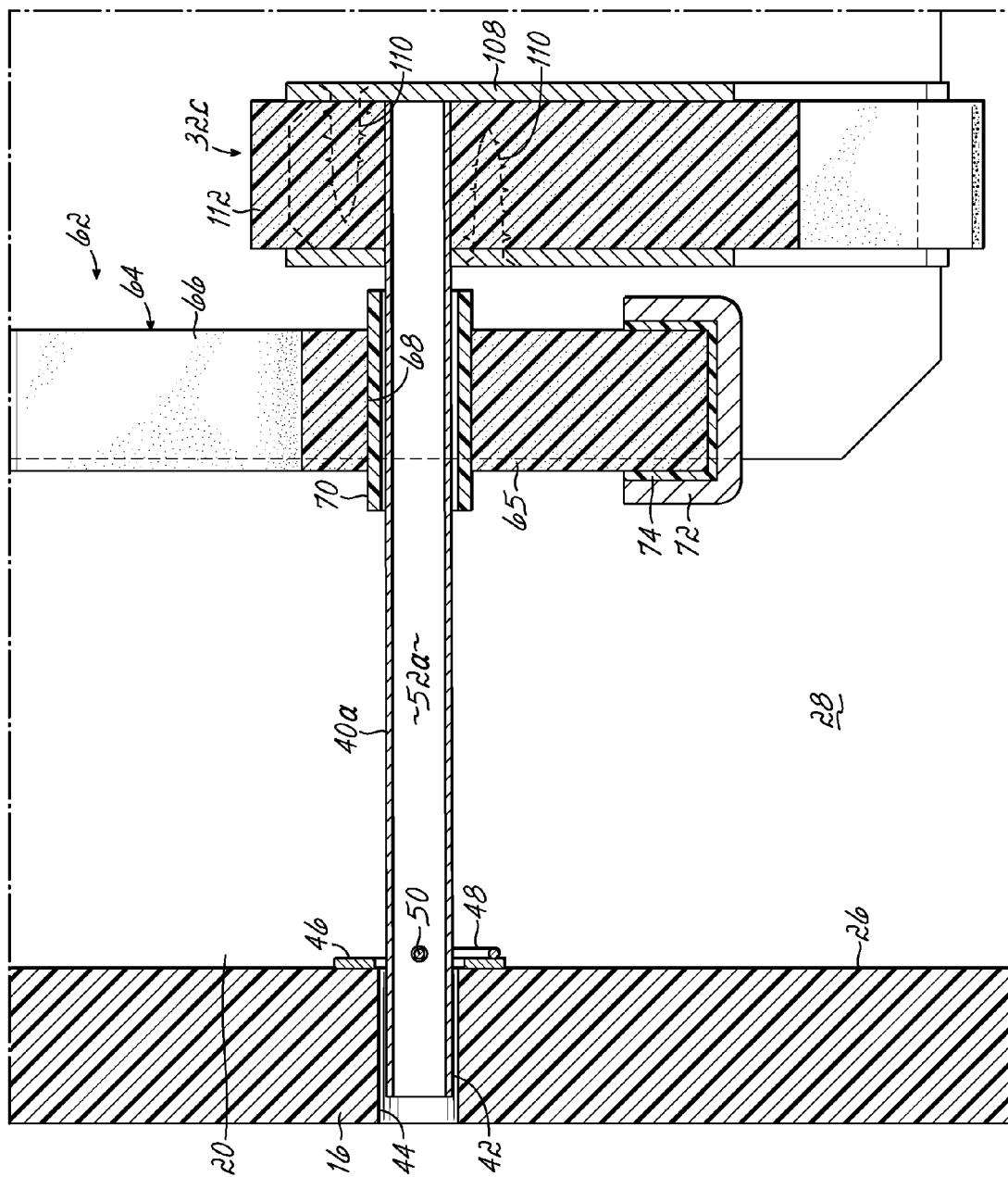
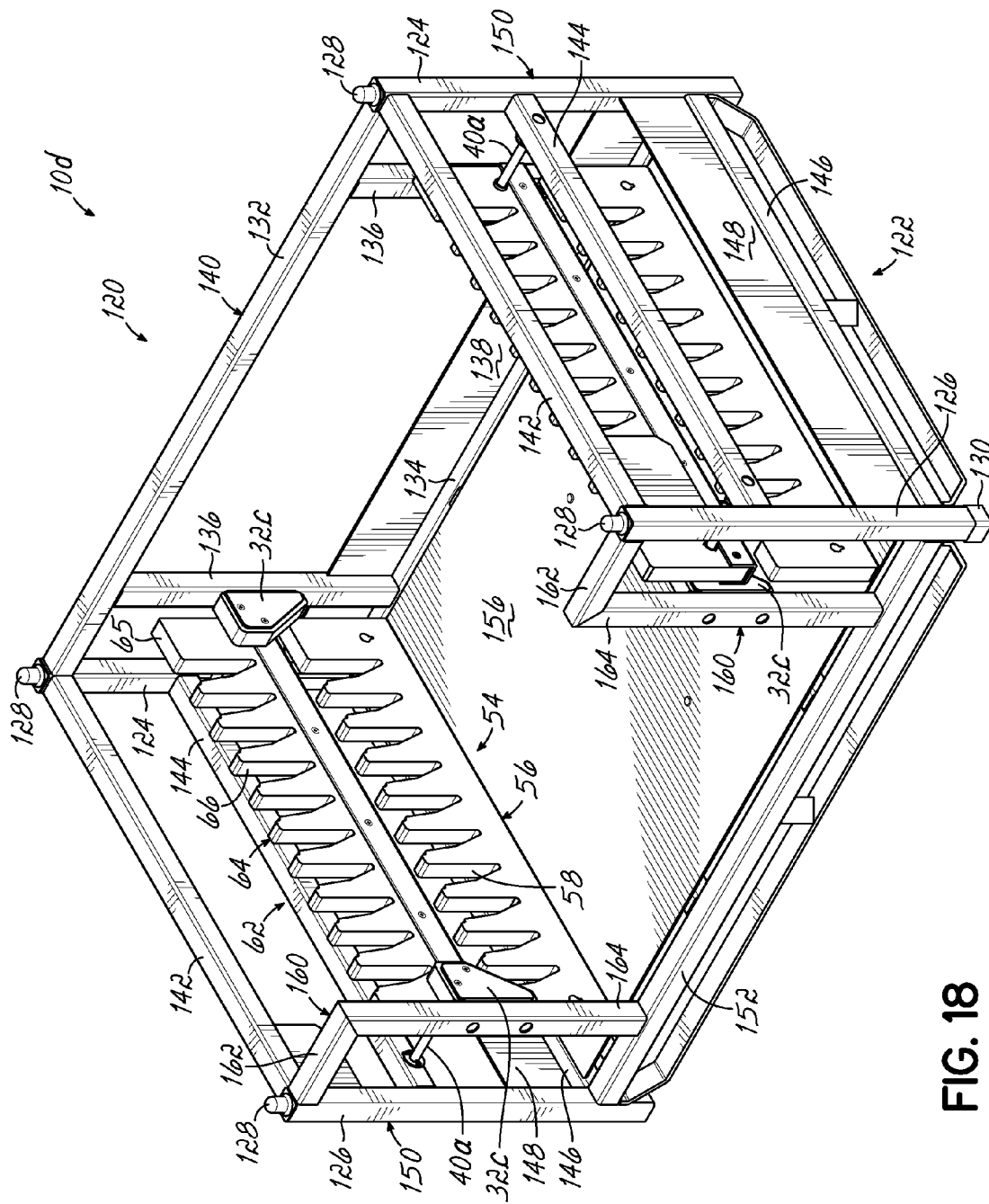


FIG. 17



**FIG. 18**

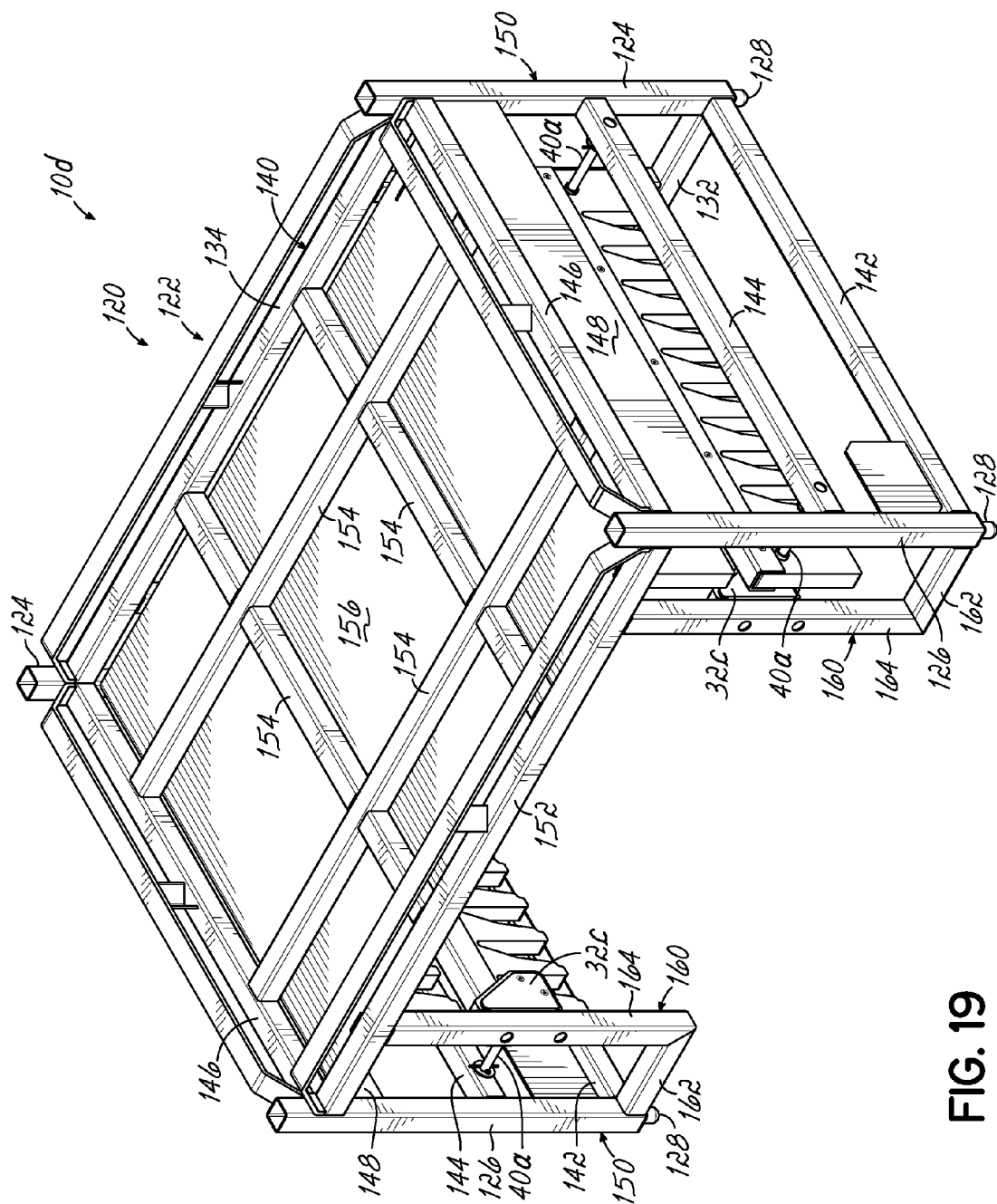
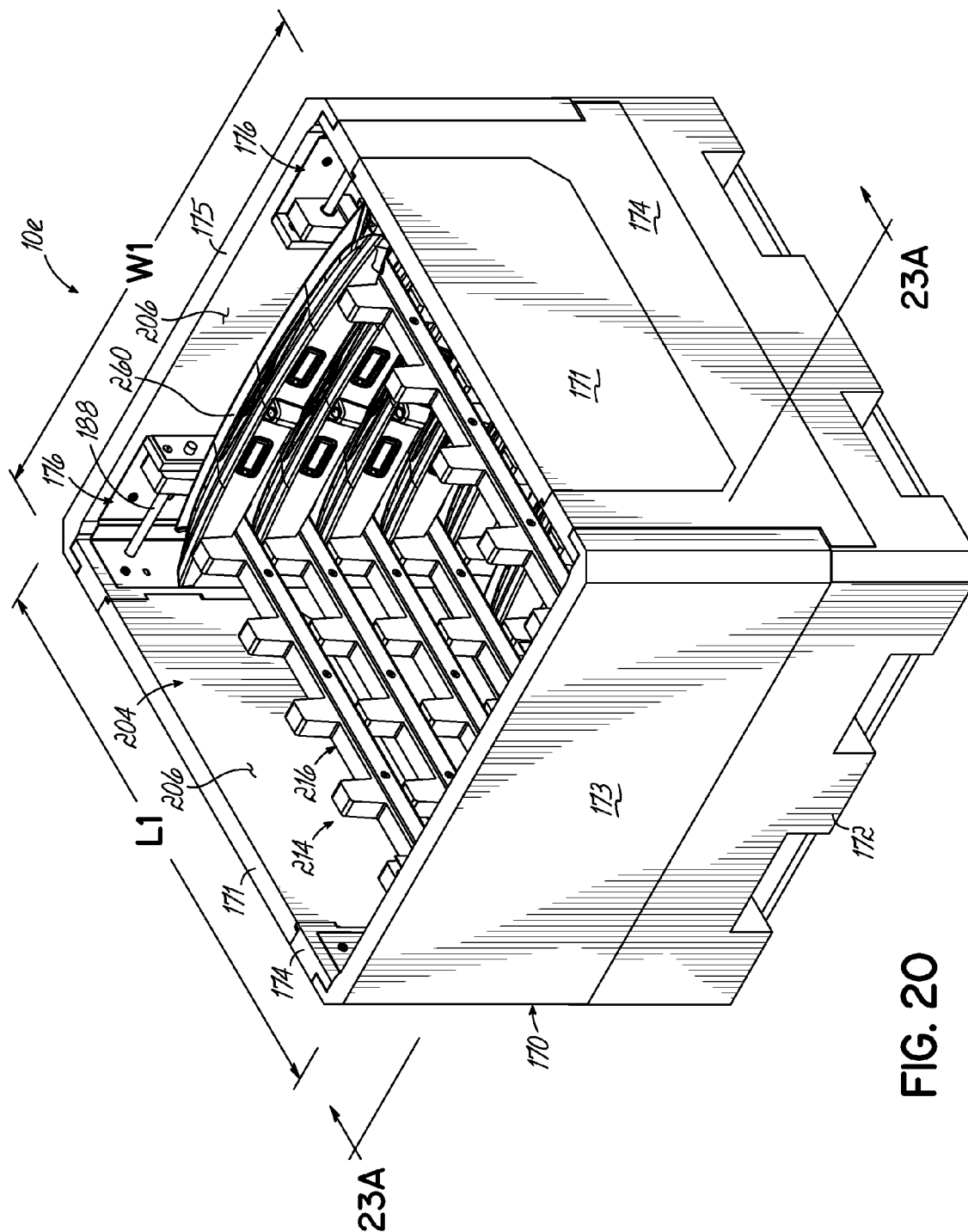


FIG. 19



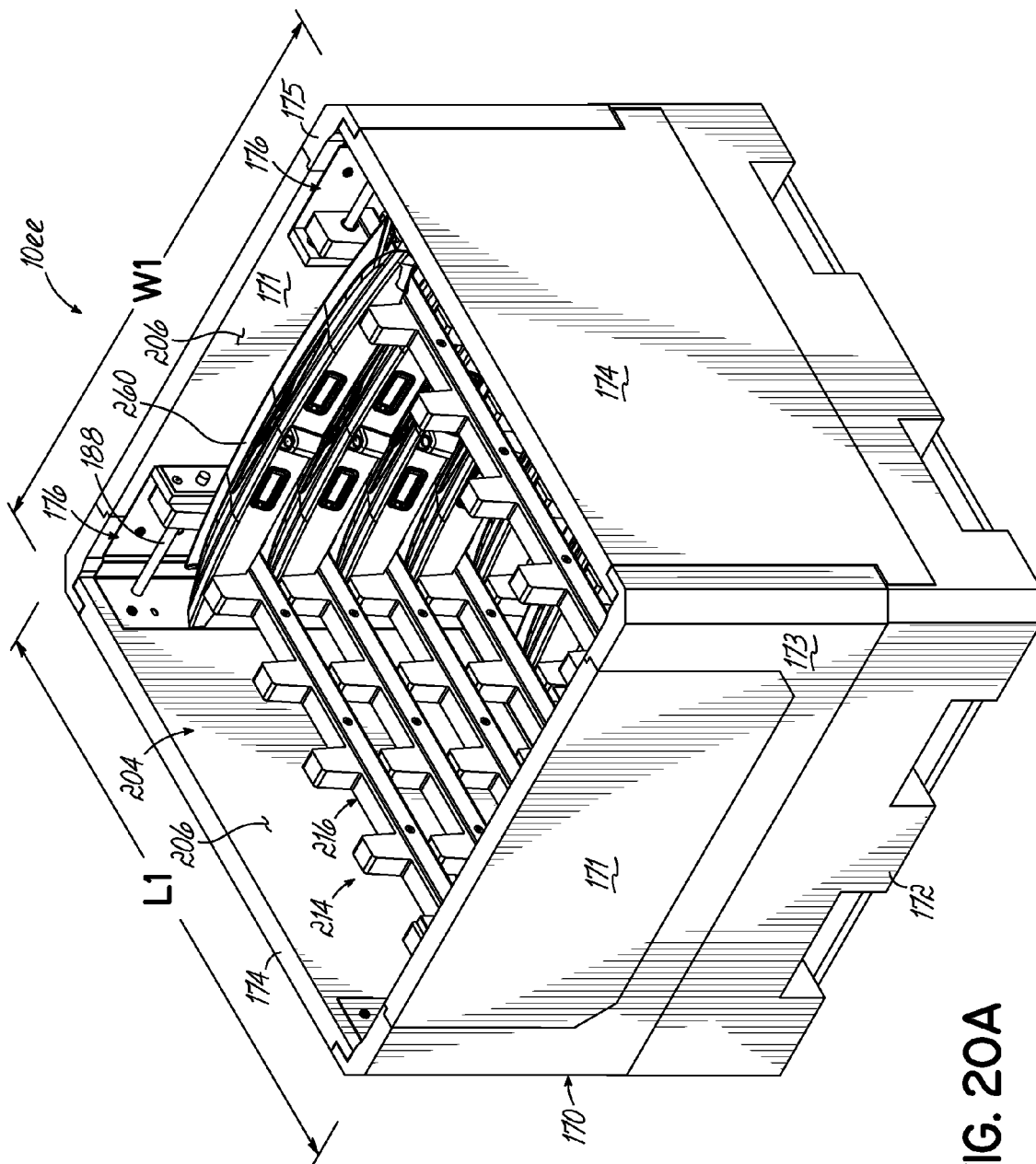


FIG. 20A



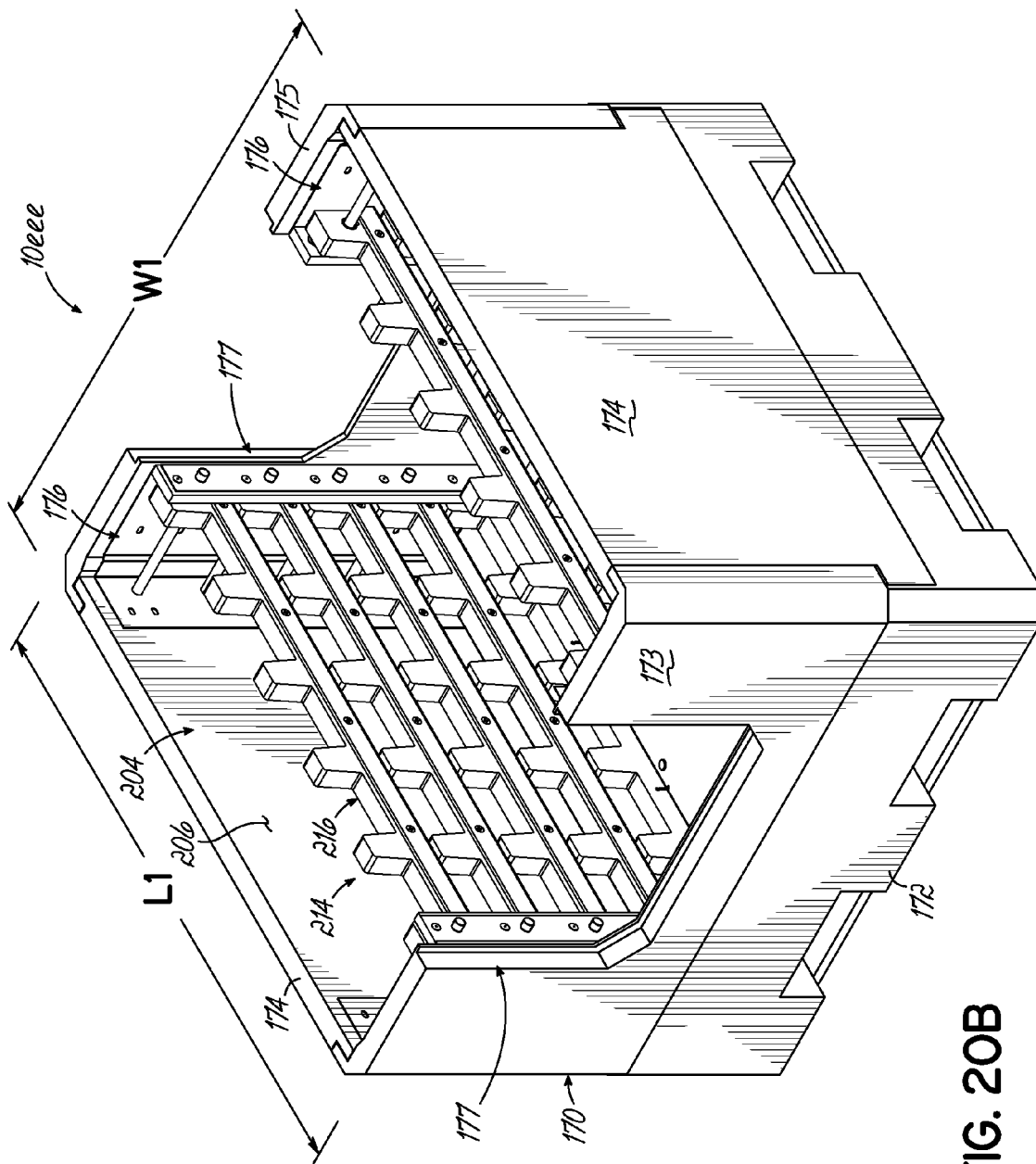


FIG. 20B

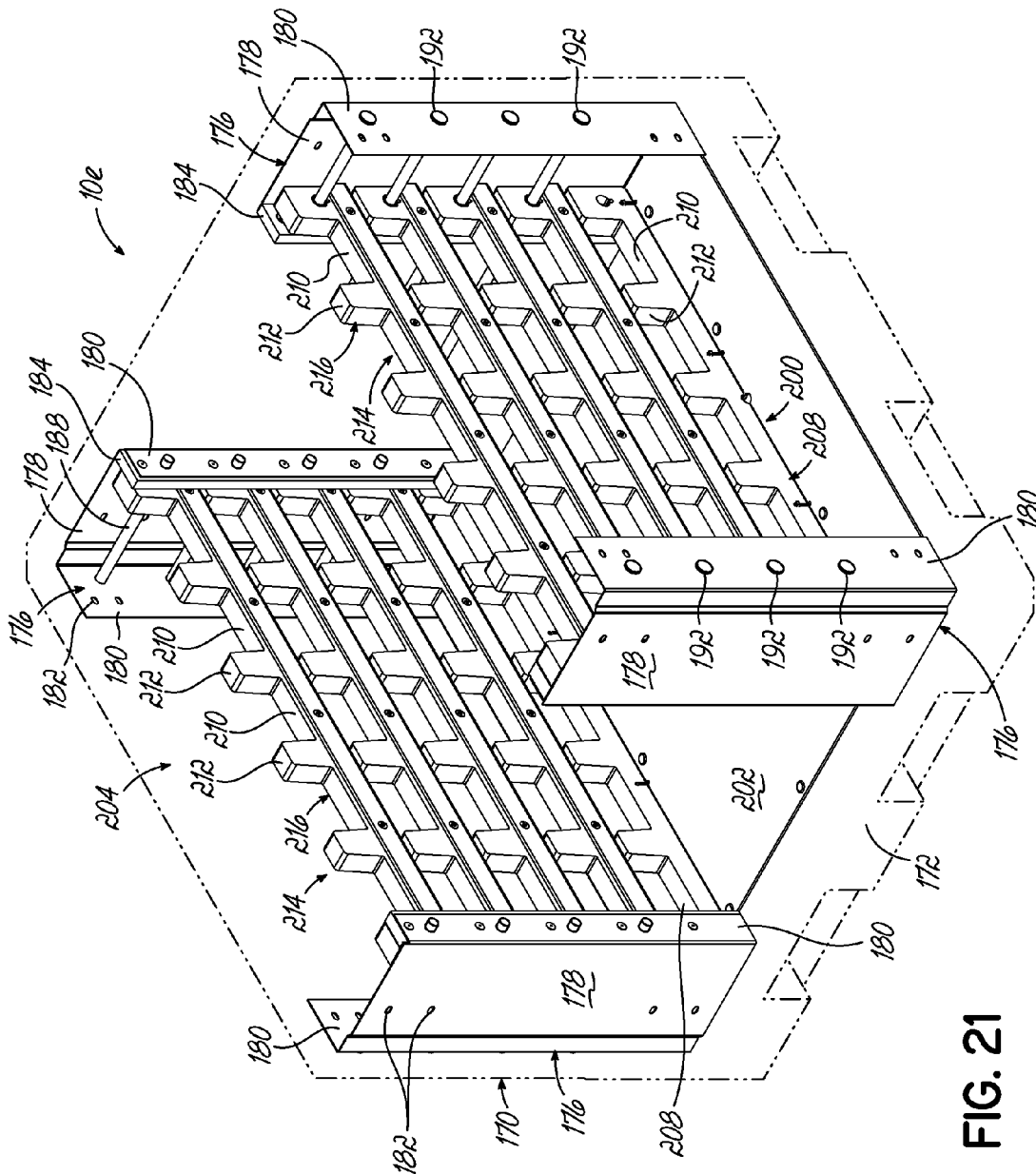


FIG. 21

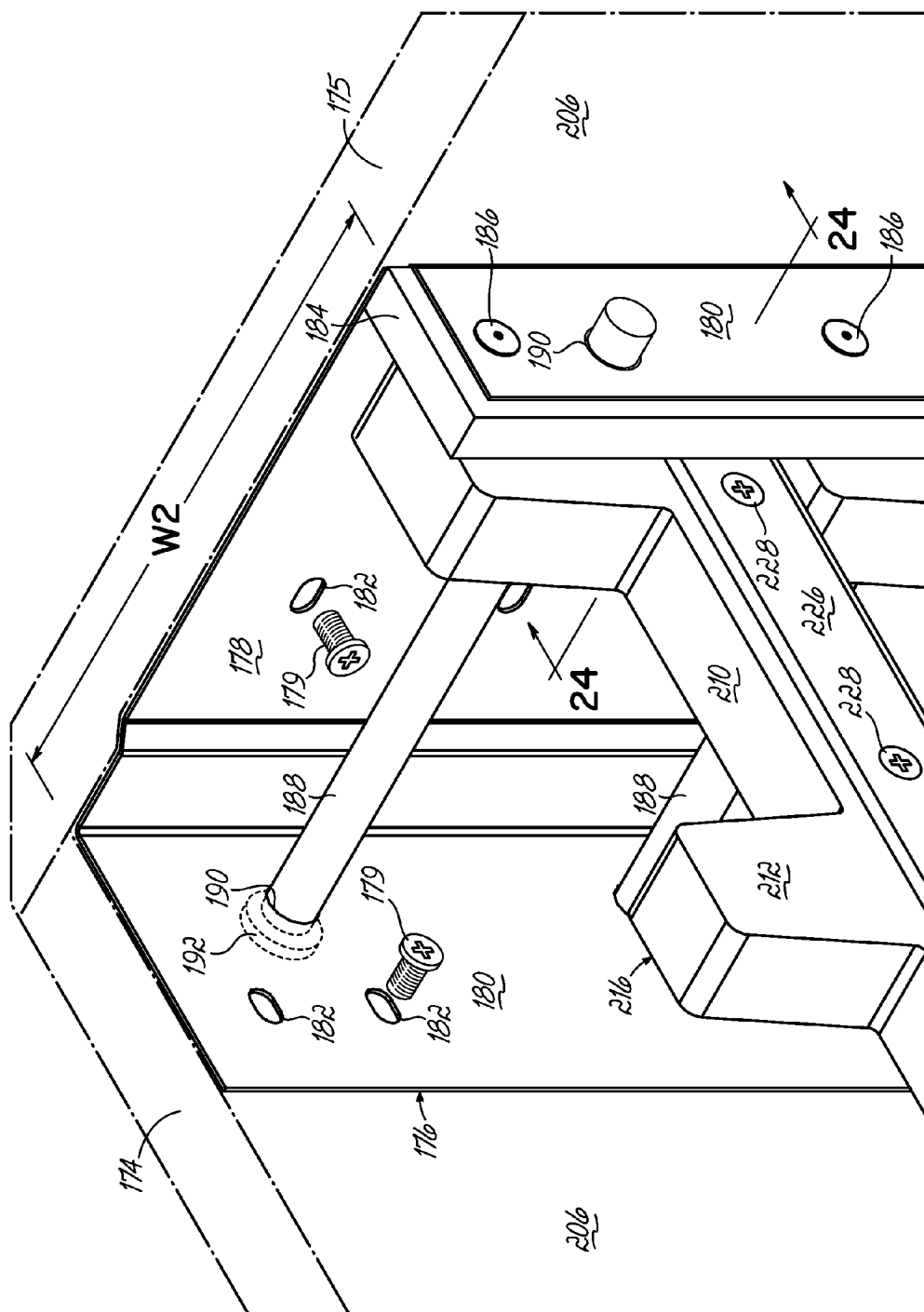
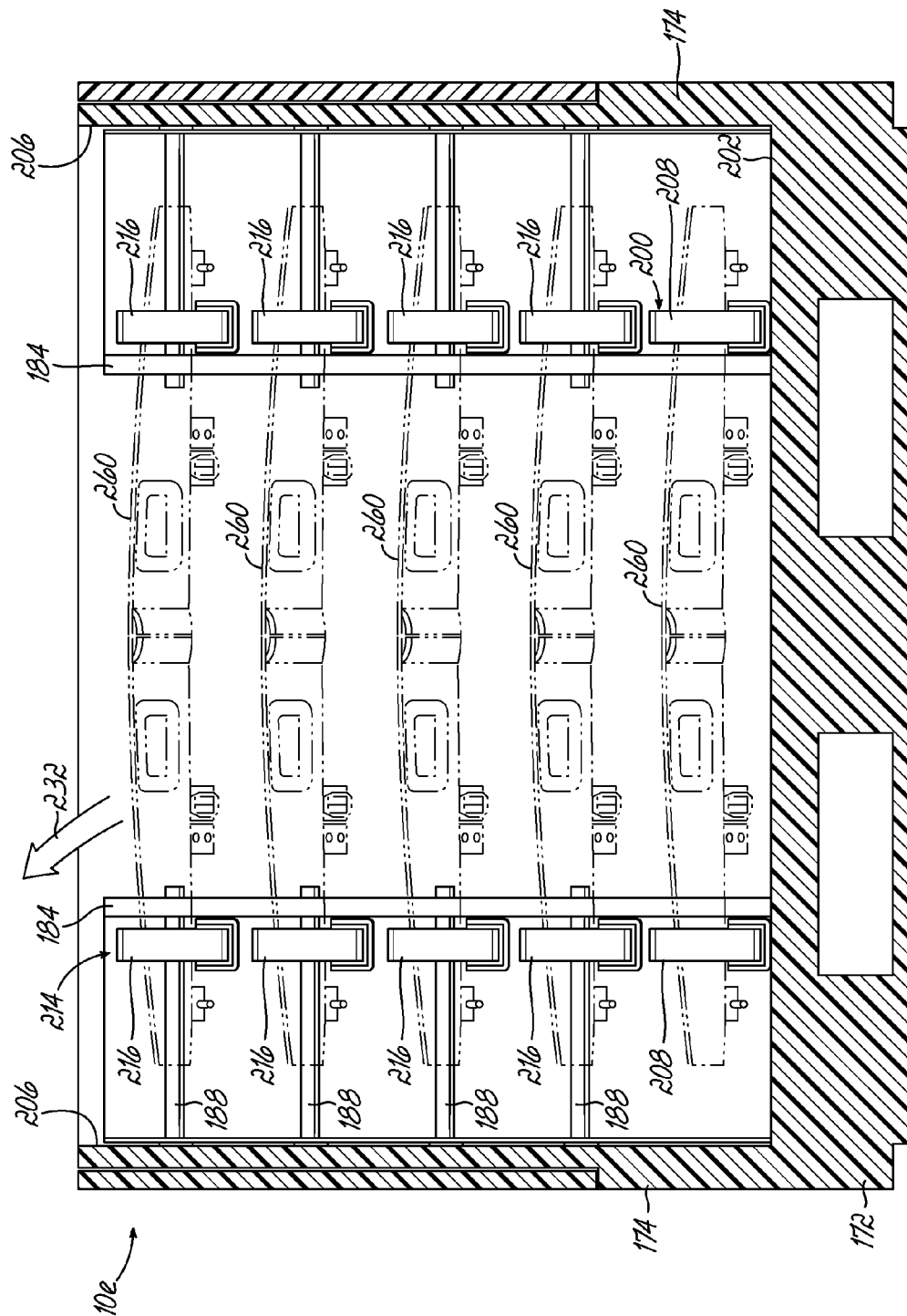


FIG. 22



**FIG. 23A**

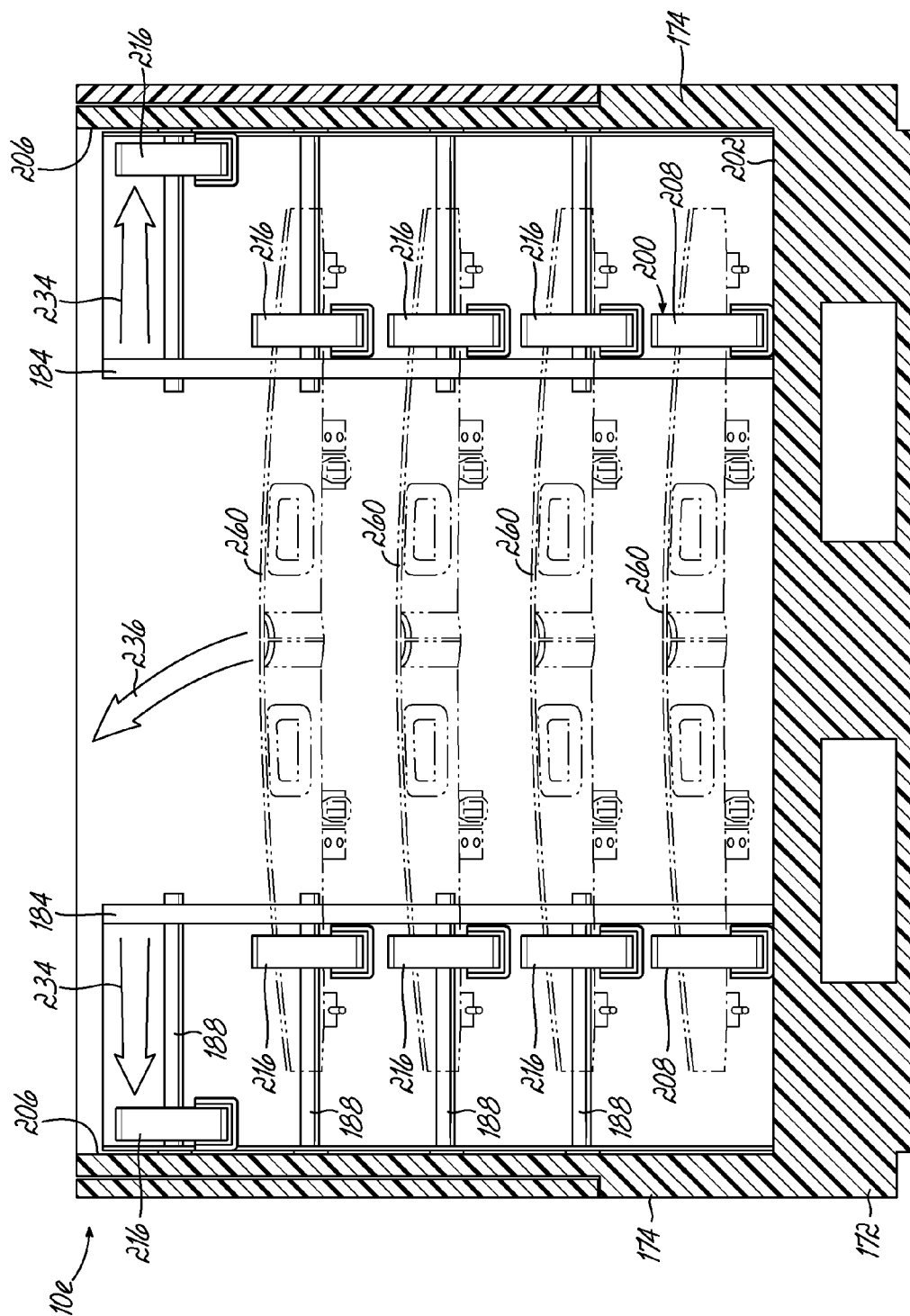


FIG. 23B

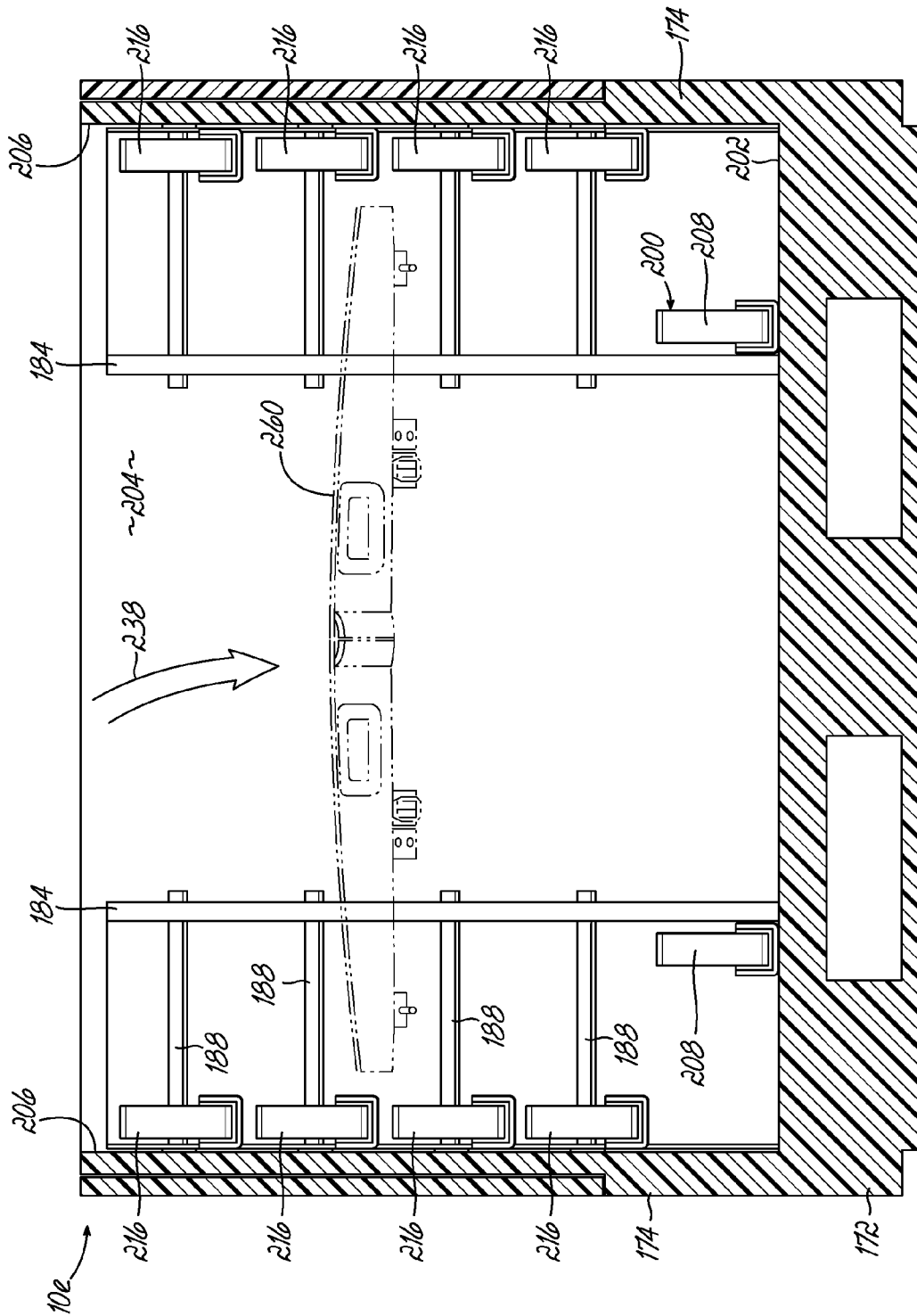


FIG. 23C

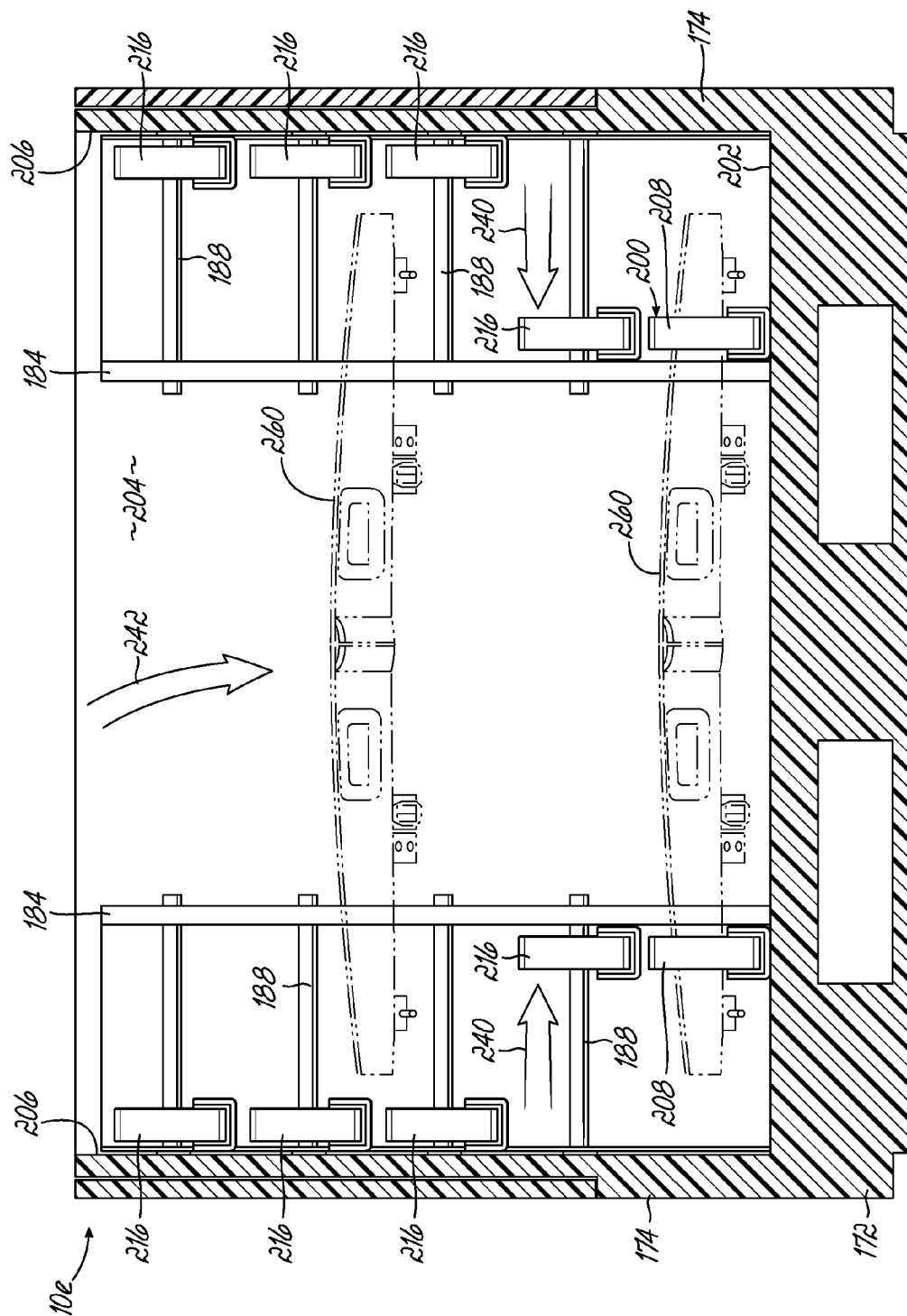


FIG. 23D

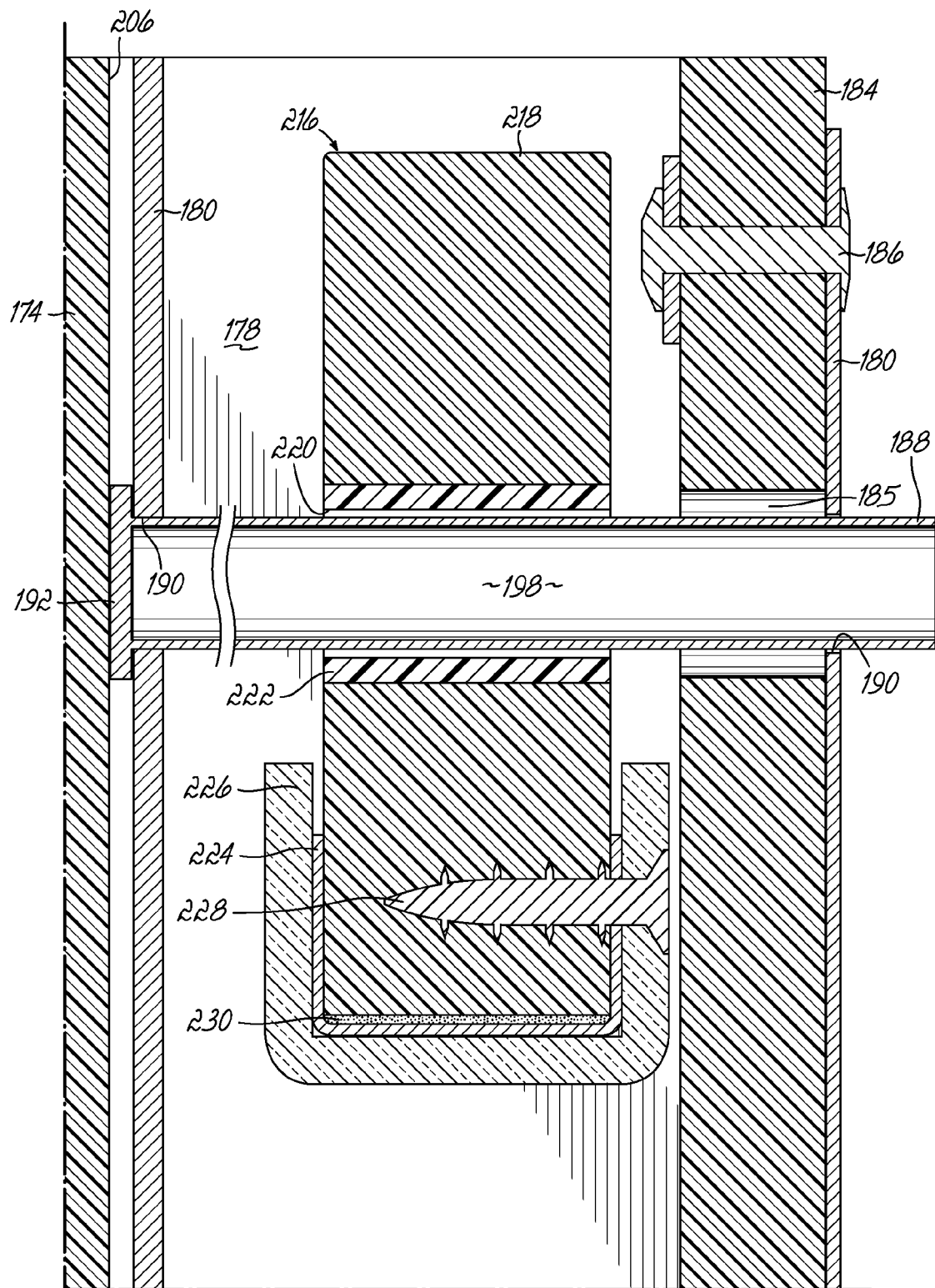


FIG. 24



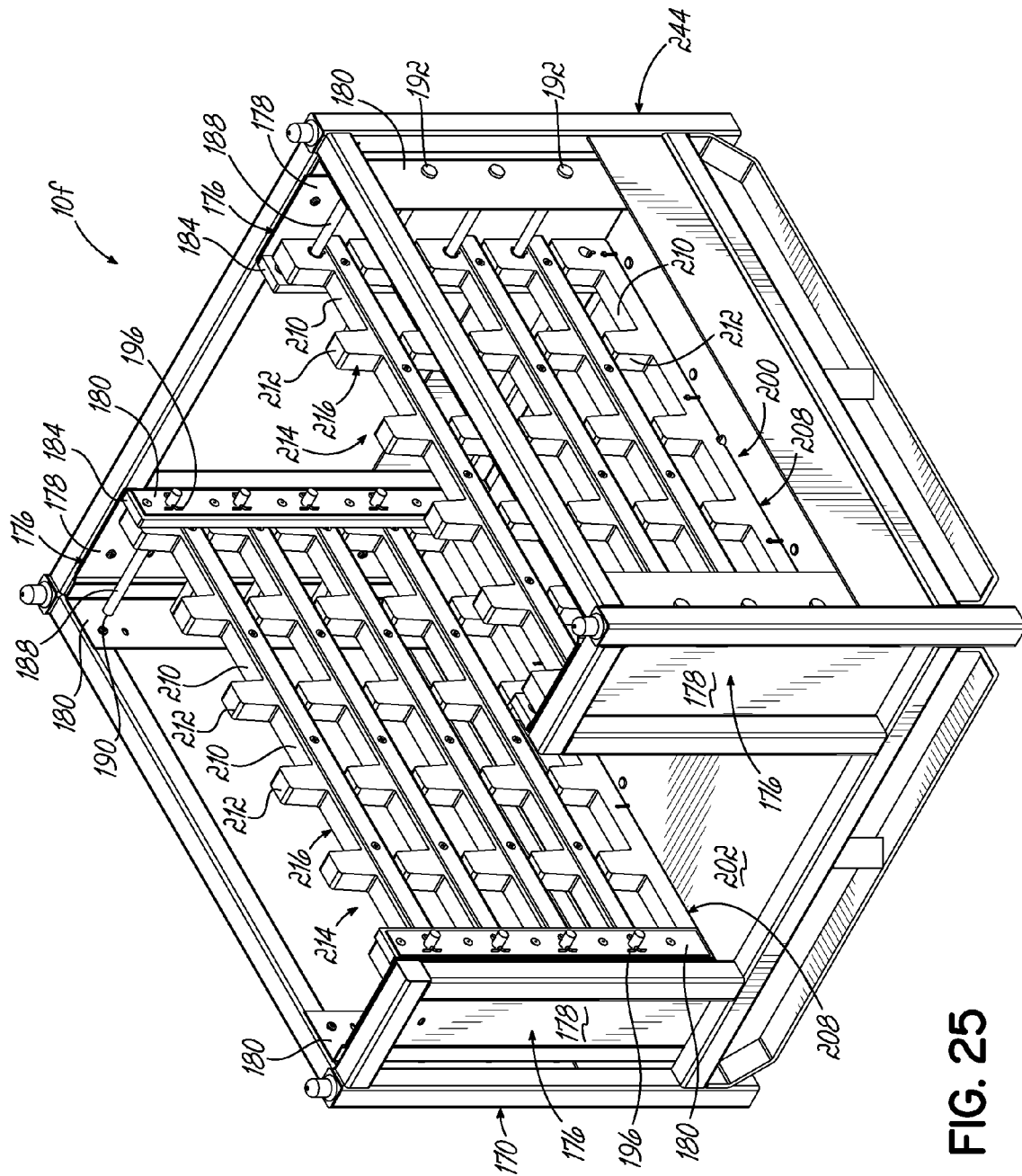
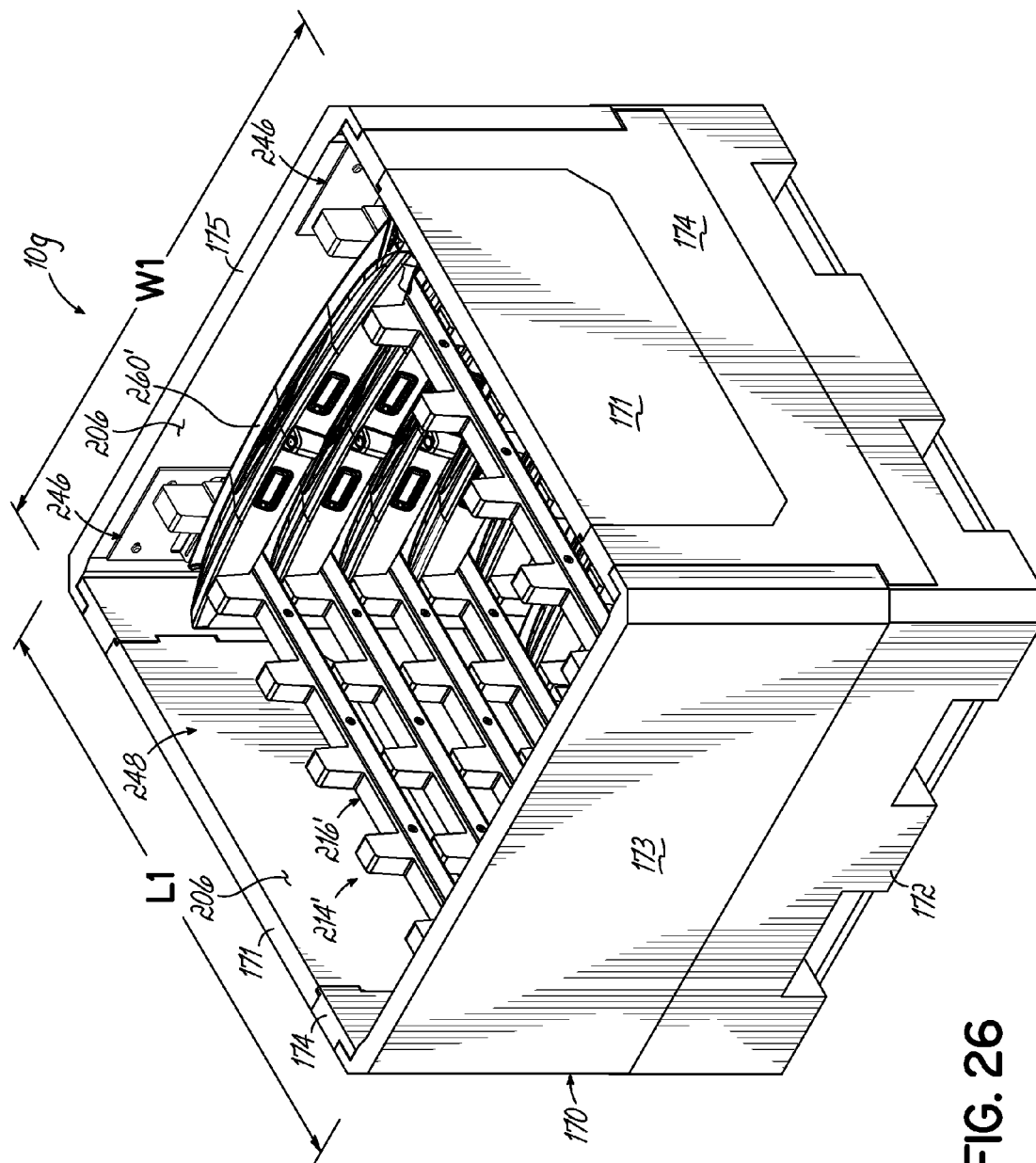
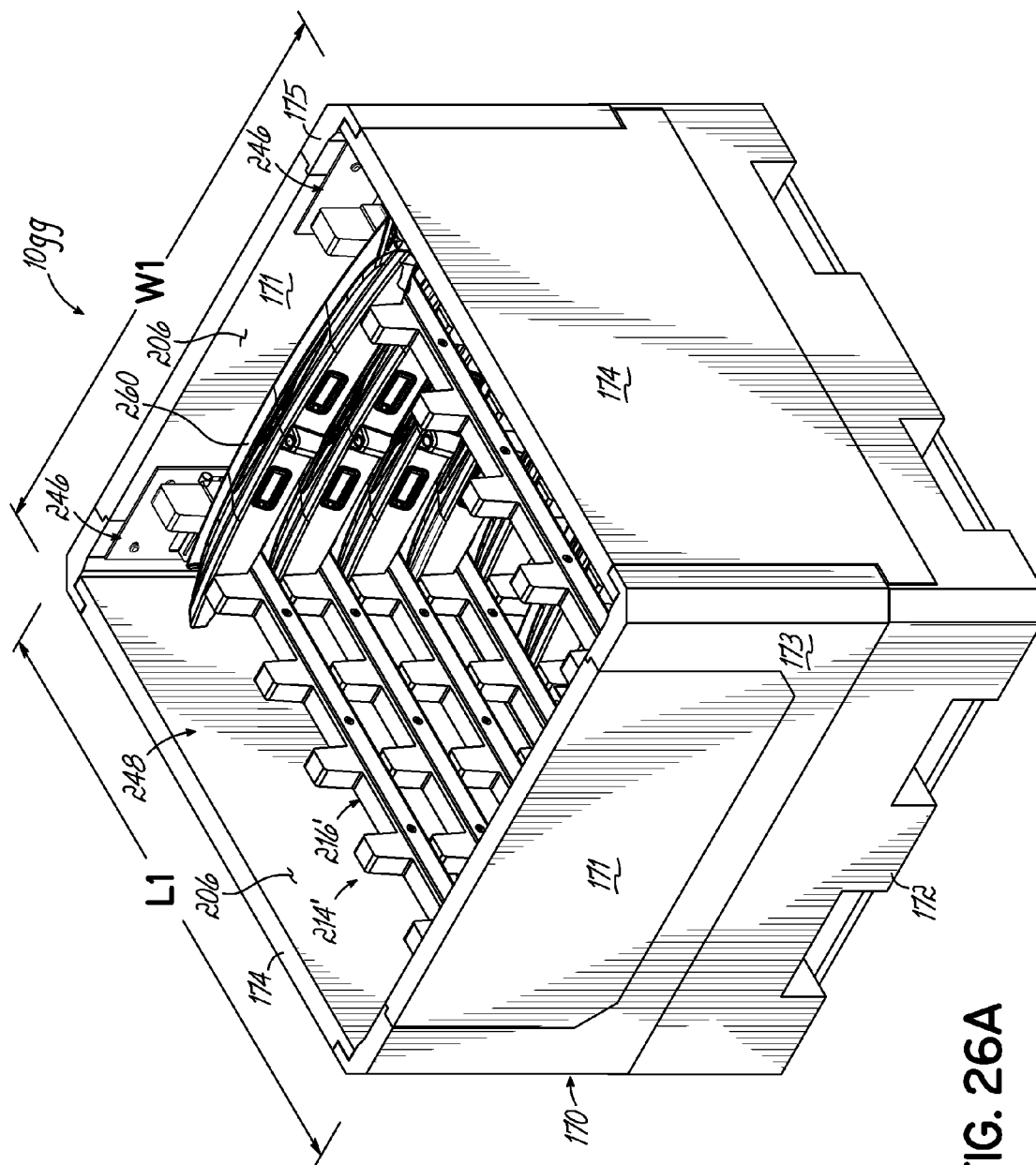


FIG. 25



**FIG. 26**



**FIG. 26A**

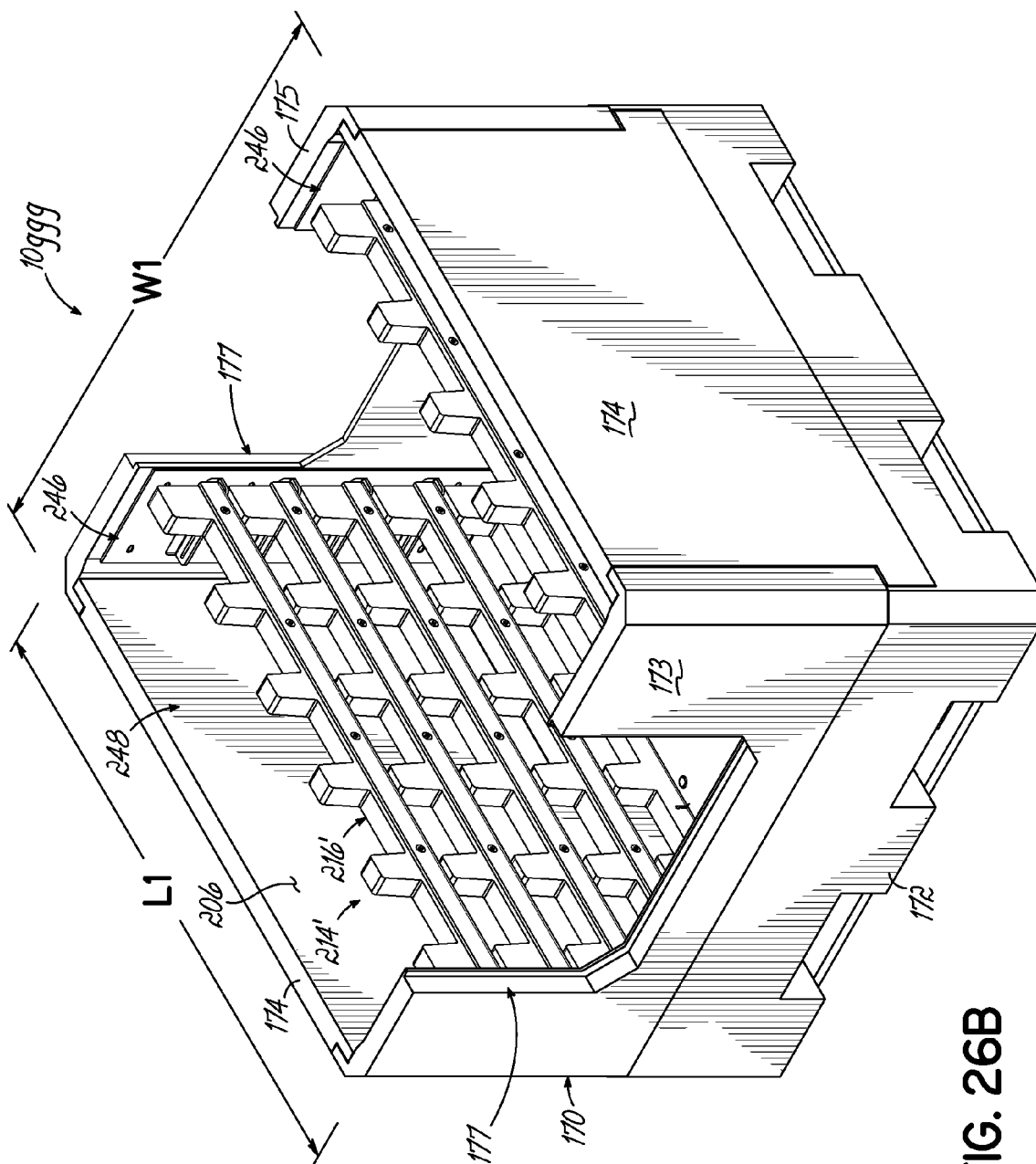


FIG. 26B

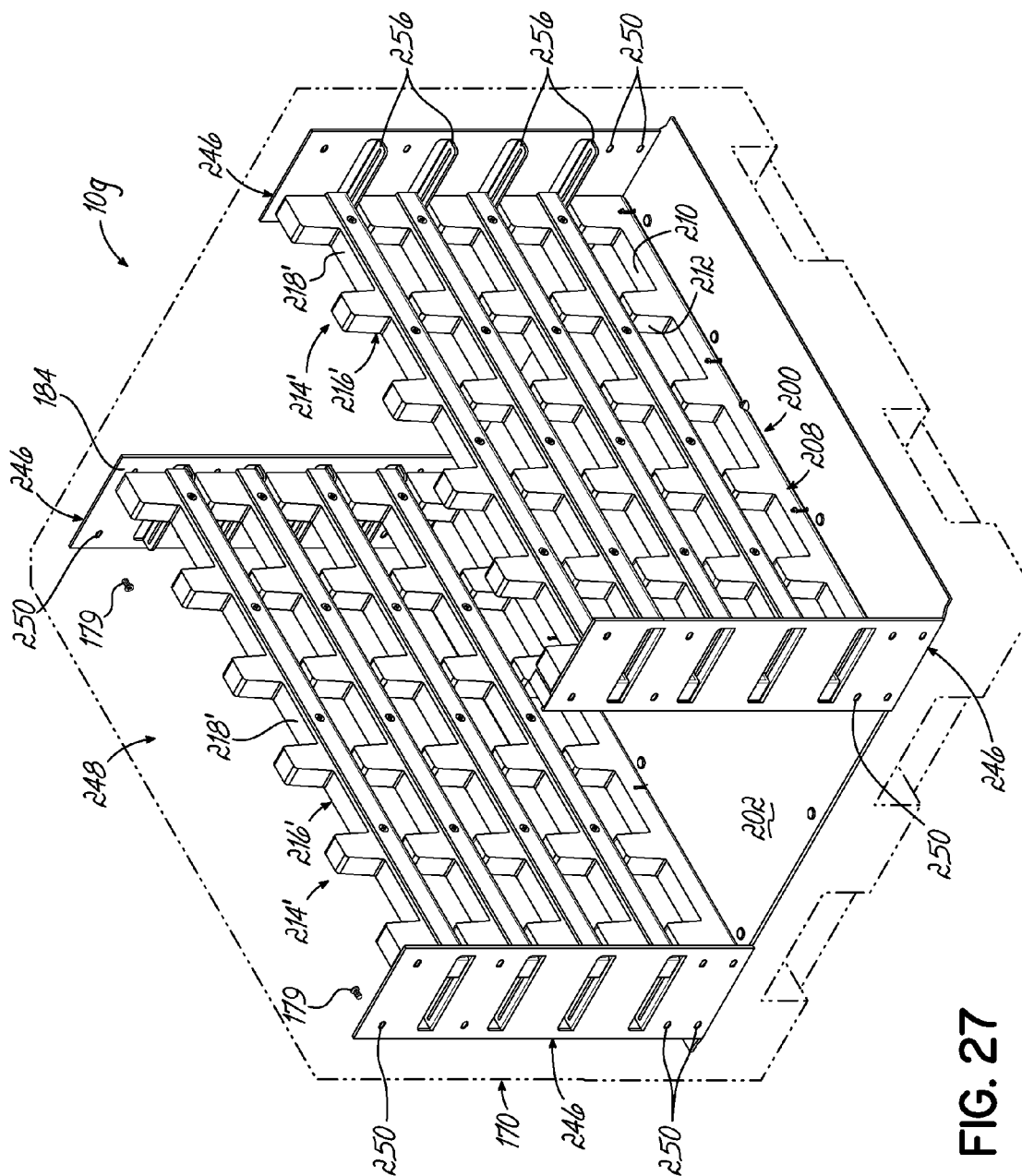
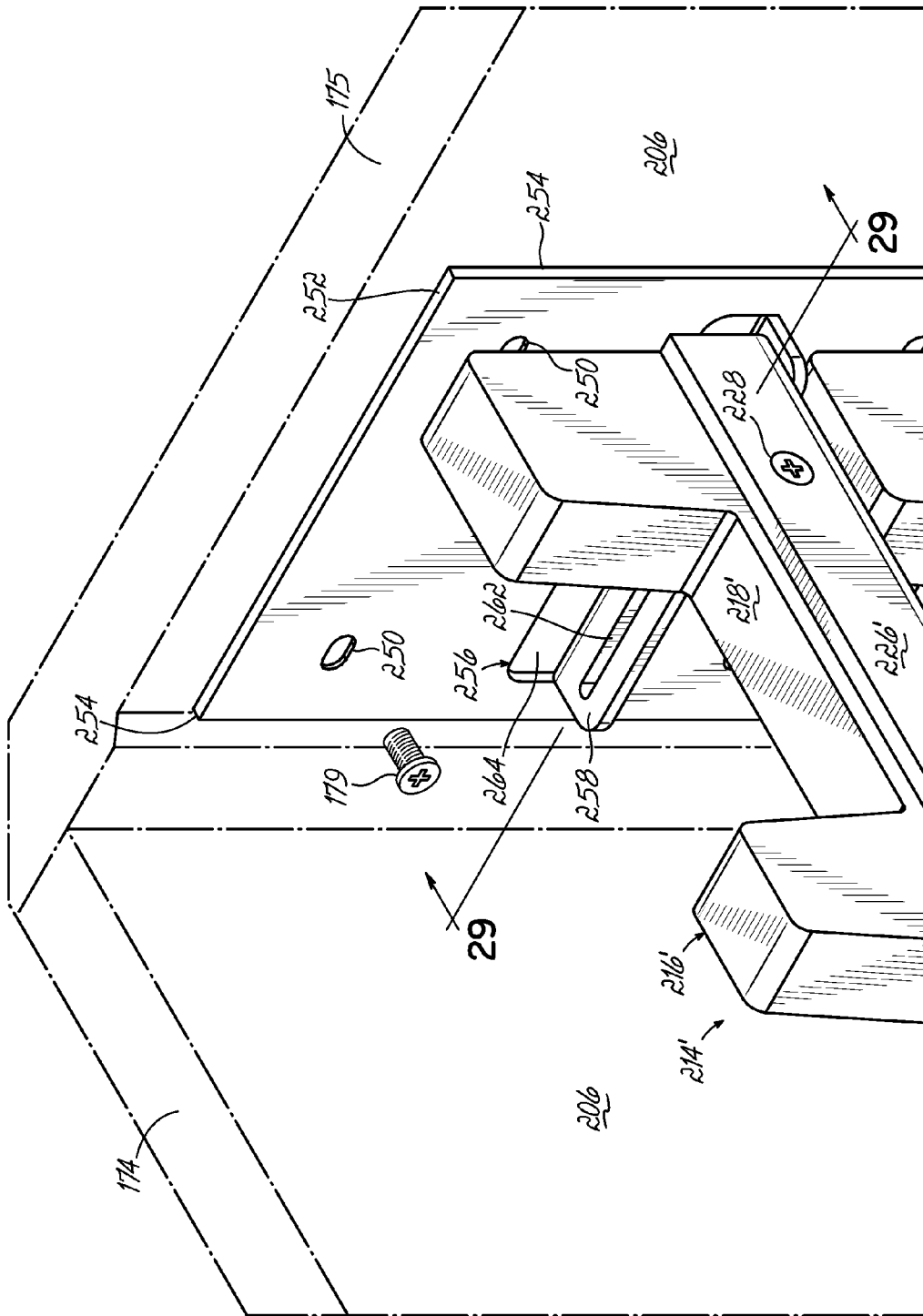


FIG. 27



**FIG. 28**

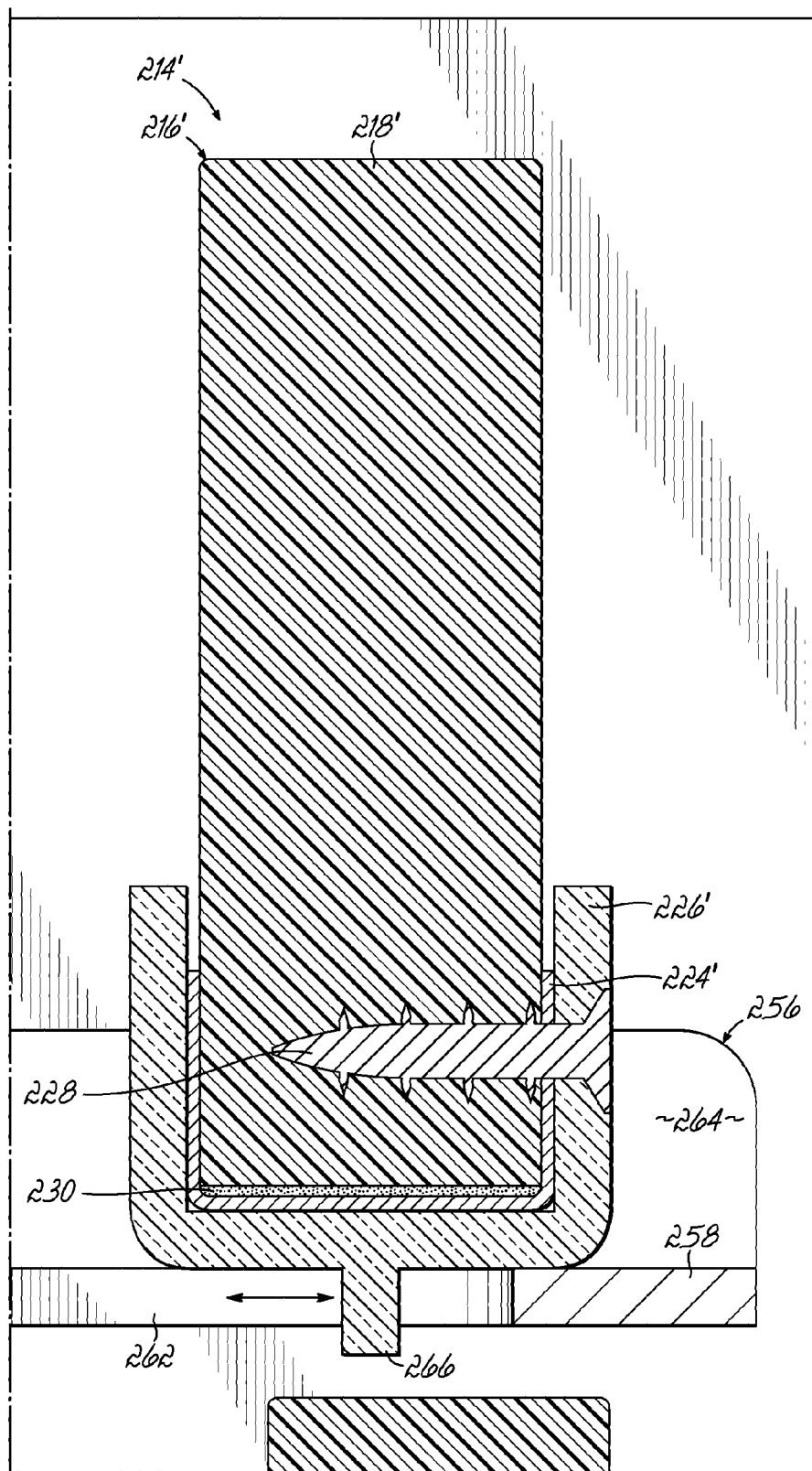


FIG. 29

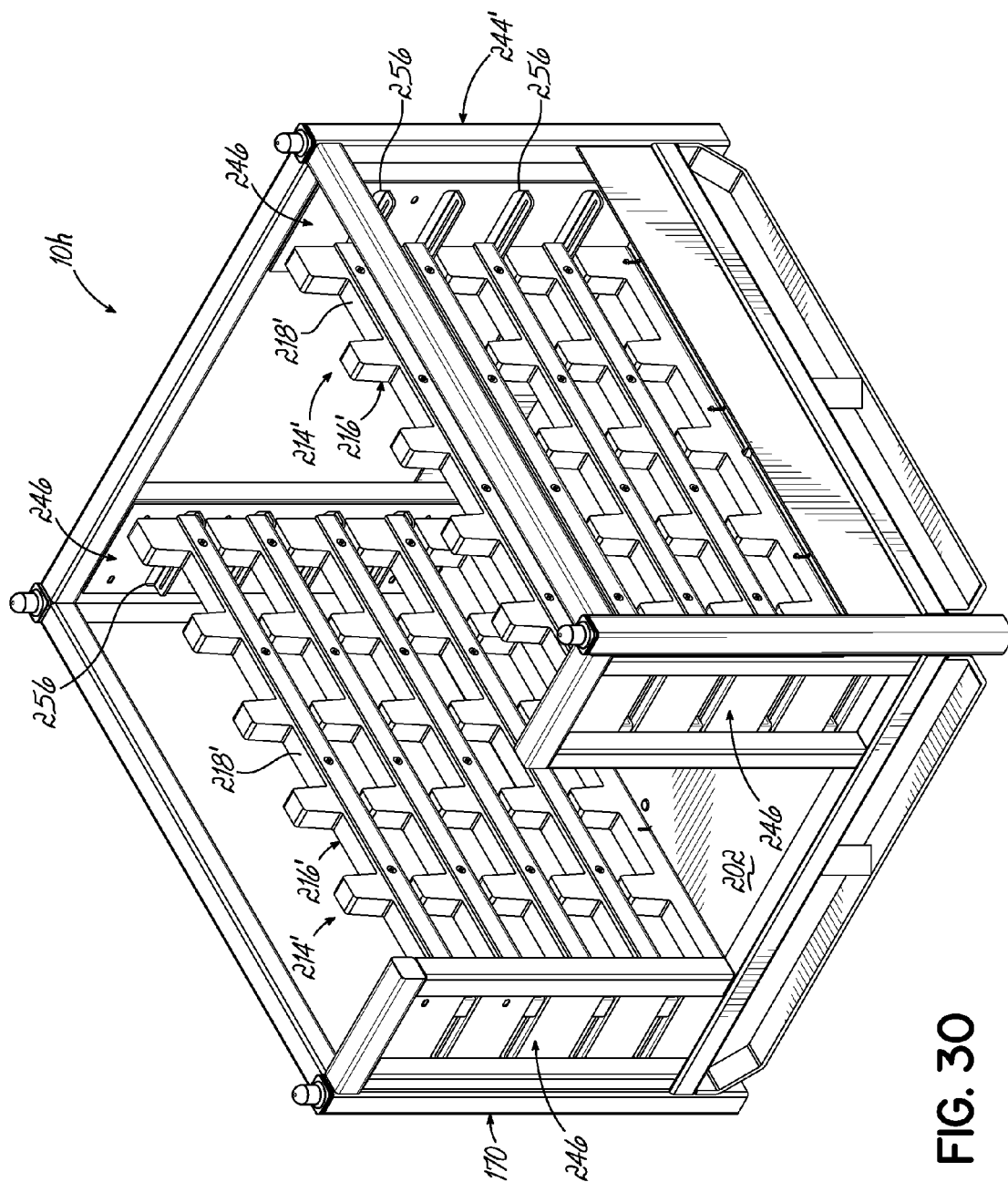


FIG. 30



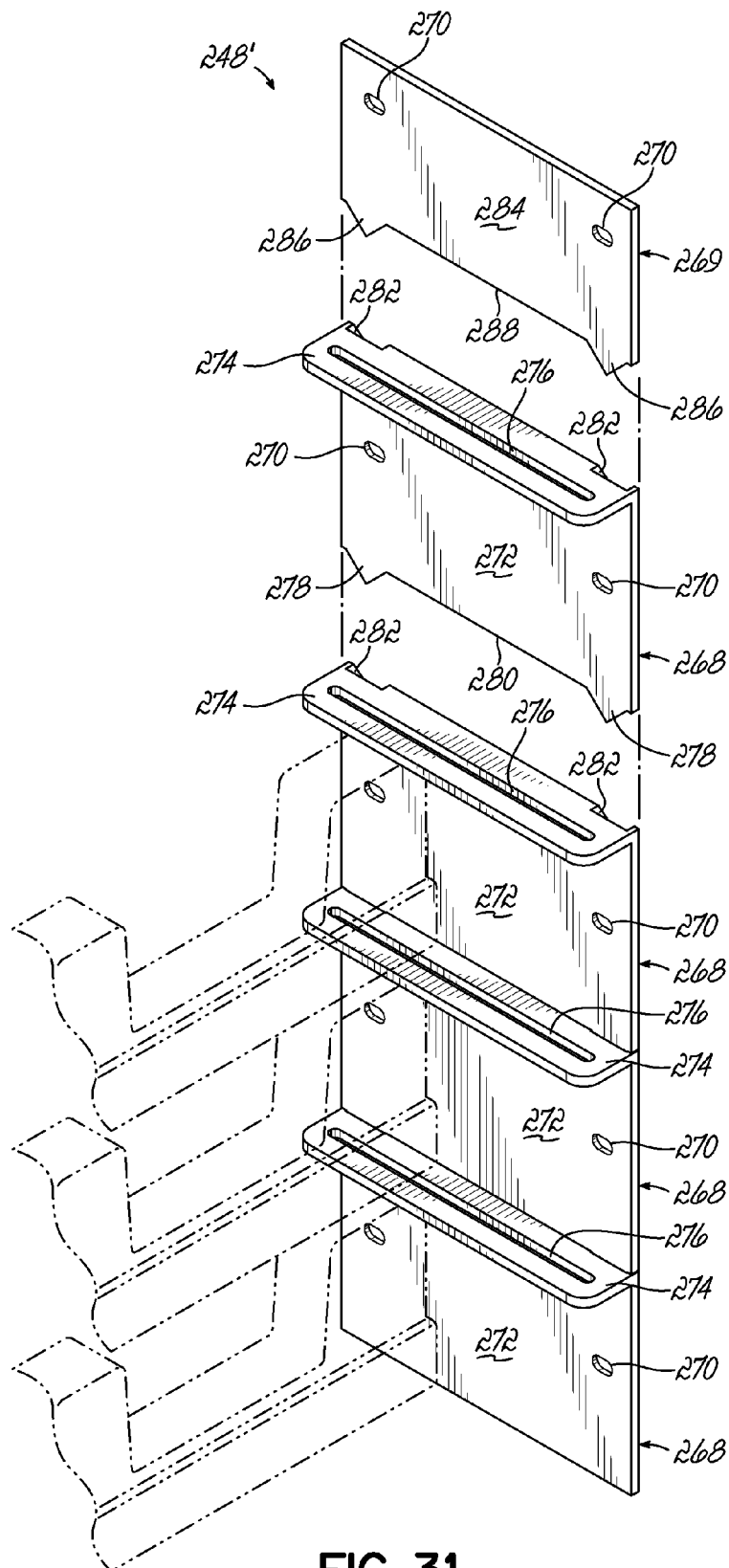


FIG. 31

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## CONTAINER HAVING DUNNAGE COMPONENTS MOVABLE IN OPPOSITE DIRECTIONS

### CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 13/956,469 filed Aug. 1, 2013, which is fully incorporated herein. This application also claims the benefit of U.S. provisional Patent Application Ser. No. 62/048,470 filed Sep. 10, 2014, which is fully incorporated herein.

### FIELD OF THE INVENTION

The present invention relates to containers for use in shipping and, more particularly, to containers with movable dunnage for supporting product during shipment and/or storage.

### BACKGROUND OF THE INVENTION

Different container structures are utilized by manufacturers to ship a variety of different products to end users which may be, for example, assembly plants. In the automobile industry, for example, an assembly plant assembling a particular automobile might utilize a number of different parts from different manufacturers. These manufacturers ship their respective parts to the assembly plant in container structures where the parts are then removed from dunnage or support members inside the container structure and assembled into a finished automobile.

Access to the product in the containers is of particular concern. Specifically, in the automotive industry, the containers full of product are positioned on an assembly line adjacent to a work area, which is associated with a particular product to be installed on a manufactured vehicle. For example, a container full of interior door panels is usually positioned next to a particular station on an assembly line where interior door panels are installed so that a line worker may easily access the door panels inside the container. The product or part is taken directly from the container and used on the line. Some existing containers are difficult to access, which makes removal of the parts therein difficult and time-consuming. For example, some containers are configured so that a line worker must walk around the container to remove parts or products from opposite ends of the container. As may be appreciated, a line worker only has a certain amount of time to install a part. Any delay in access and removal of the part from the container is undesirable.

In many containers, a line worker or employee must insert or remove parts from a lower part of the container. Sometimes the size and/or weight and/or configuration of the parts or work pieces may make inserting or removing such parts from a lower level of the container difficult due, in part, to the configuration or location of the dunnage inside the container. Such difficulty may cause stress or strain on the line worker and, more particularly, on the back of the worker when inserting or removing parts from the lower part of such a container. Such ergonomically unfriendly movements may cause physical trauma, pain and other injuries that may lead to lost production time.

Therefore, there is a need for a container with movable dunnage inside the container so an operator may more easily load or unload parts from inside the container. Such movable

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dunnage may alleviate stress and/or strain on the operator's body during loading and/or unloading processes.

Containers having movable dunnage in the form of pouches are known. Such containers may be adapted to store and ship parts residing inside the pouches. Some parts or products are more easily, cost effectively and/or safely shipped/stored in dunnage other than pouches.

Accordingly, there is a need for a container having movable dunnage in a form other than pouches.

There is further a need for a container having multiple levels of dunnage other than pouches in order to ship additional parts or products.

### SUMMARY OF THE INVENTION

The present invention provides a container for holding product therein during shipment and/or storage that has a body and upper and lower levels of dunnage components supported, at least in part, by the body. For purposes of this document, the term dunnage component refers to both a single dunnage member and multiple pieces or members joined together into a dunnage assembly. In some embodiments, at least one movable dunnage component may move above at least one stationary dunnage component for ease of loading/unloading products into the dunnage for shipment or storage. In some embodiments, two movable upper dunnage components may be moved away from each other or separated in order to aid the loading or unloading of parts into or out of the lower level of dunnage. Separating the upper dunnage components increases the size of an opening through which a part must pass to be loaded into the lower level of dunnage or unloaded from the lower level of dunnage. In other embodiments, only one of the two upper dunnage components may be movable.

According to one aspect of the present invention, the container has a base and at least two opposed walls or side structures. The container further comprises upper and lower levels of dunnage for holding products during storage and shipment. The lower level of dunnage is often stationary, but may be movable in certain applications. The upper level of dunnage components may be at least partially movable to facilitate insertion and removal of products from an interior of the container. Supports are operatively coupled to opposed side structures of the container and guides supported by the supports. The upper level of dunnage comprises multiple dunnage components. The guides direct at least one of the upper dunnage components to a desired position away from another dunnage component to facilitate insertion and removal of products from the lower level of dunnage.

At least one of the dunnage components may include a dunnage member made at least partially of foam. Any other material, such as plastic or wood, may be used for the dunnage components of either level.

The container guides may be rails, beams, rods or tubes made of metal, such as aluminum, or any other suitable material. The guides may extend the length or width of the interior of the container. Alternatively, each of the guides may be less than the length or width of the container's interior.

According to another aspect of the invention, the container comprises a base and at least two opposed side structures. The container further comprises supports operatively coupled to opposed side structures of the container. The container has multiple levels of dunnage for holding products during storage and shipment. At least one level of dunnage may be stationary. At least one level of dunnage

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may be at least partially movable to facilitate insertion and removal of products into and out of a lower level of dunnage. Guides may be supported by the supports, the guides directing at least one dunnage component of the upper level of dunnage to a desired position to facilitate removal or insertion of products into and out of the lower level of dunnage. The upper level of dunnage may comprise two dunnage components, each of the upper dunnage components having at least one opening which one of the guides passes, such that the upper dunnage component may be guided to a desired position.

According to another aspect of the invention, a method of unloading products from inside a container is disclosed. The method comprises removing products extending between movable dunnage components of an upper level of dunnage. At least one of the dunnage components of the upper level of dunnage is movable away from another dunnage component of the upper level of dunnage. The next step comprises moving at least one of the dunnage components of the upper level of dunnage from a first position to a second position, the dunnage components of the upper level of dunnage being further away from each other in the second position than in the first position. The next step comprises removing products of a lower level of dunnage while the dunnage components of the upper level of dunnage are in their second position.

According to another aspect of the invention, a method of loading products into a container is disclosed. The method comprises inserting products into a lower level of dunnage while dunnage components of an upper level of dunnage are spaced away from each other in an open position. At least one of the dunnage components of the upper level of dunnage is movable away from another of the dunnage components of the upper level of dunnage. The next step comprises moving the dunnage components of the upper level of dunnage towards each other into a closed position. The last step comprises inserting products into notches into the upper level of dunnage.

According to another aspect of the invention, a method of loading products into a container is disclosed. The method comprises inserting products into a lower level of dunnage while dunnage components of an upper level of dunnage are spaced away from each other in an open position. The next step comprises moving the dunnage components of the upper level of dunnage towards each other into a closed position. The last step comprises inserting products into the dunnage components of the upper level of dunnage.

According to another aspect of the invention, a method of unloading products from inside a container is disclosed. The method comprises removing products from an upper level of dunnage. The next step comprises moving the dunnage components of the upper level of dunnage from a first position to a second position, the dunnage components of the upper level of dunnage being further away from each other in the second position than in the first position. The last step comprises removing products from a lower level of dunnage while the dunnage components of the upper level of dunnage are in their second position.

The container may have at least one door. The movable dunnage of the upper level allows product to be more efficiently and safely removed from the container or inserted therein without unnecessary stress or strain on the operator. Although the containers shown and described herein contain two levels or layers of dunnage, the container may have three or more layers or levels of dunnage.

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The ease of operation and other objects and advantages of the present invention shall be made apparent from the accompanying drawings and the brief description thereof.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with a general description of the invention given above and the detailed description of the embodiments given below, serve to explain the principles of the invention.

FIG. 1 is a perspective view of one embodiment of a reusable and returnable container;

FIG. 2 is a perspective view of the container of FIG. 1 showing the dunnage inside the container;

FIG. 3 is an enlarged perspective view of a portion of the container shown in FIGS. 1 and 2;

FIG. 3A is an enlarged perspective view of a portion of another embodiment of container having upper dunnage components comprising unitary pieces;

FIG. 3B is an enlarged perspective view of a portion of another embodiment of container having different upper dunnage components;

FIG. 3C is an enlarged perspective view of a portion of another embodiment of container having different upper dunnage components;

FIG. 3D is an enlarged perspective view of a portion of another embodiment of container having different upper dunnage components and different guides;

FIG. 4 is a partial cross-sectional view of a portion of the container shown in FIG. 1;

FIG. 5 is a partial cross-sectional view, like FIG. 4, showing a different upper dunnage component;

FIG. 6A is a cross-sectional view of the container shown in FIG. 1, the dunnage, components of the upper level being shown in a closed position and products being shown in dashed lines;

FIG. 6B is a cross-sectional view of the container shown in FIG. 6A, the dunnage components of the upper level being shown in an open position and products of the lower level being shown in dashed lines;

FIG. 6C is a cross-sectional view, of the container shown in FIG. 6B, the dunnage components of the upper level being shown in an open position and products of the lower level being removed from inside the container;

FIG. 6D is a cross-sectional view of the container shown in FIG. 1, products being loaded into the dunnage components of the lower level;

FIG. 6E is a cross-sectional view of the container shown in FIG. 6D, the dunnage components of the upper level shown being moved to a closed position after the lower level of dunnage is fully loaded with products;

FIG. 6F is a cross-sectional view of the container shown in FIG. 6D, the dunnage components of the upper level being shown in a closed position and products being loaded into the dunnage of the upper level;

FIG. 7 is a perspective view of another embodiment of a reusable and returnable container;

FIG. 8 is a perspective view of the container of FIG. 7 showing the dunnage inside the container;

FIG. 9 is a partial cross-sectional view of a portion of the container shown in FIGS. 7 and 8;

FIG. 10 is a perspective view of another embodiment of a reusable and returnable container;

FIG. 11 is a perspective view of the container of FIG. 10 showing a door or portion of the container being removed;

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FIG. 12 is an enlarged perspective view of a portion of the container shown in FIG. 10;

FIG. 13 is a partial cross-sectional view of a portion of the container shown in FIGS. 10 and 12;

FIG. 14 is a perspective view of another embodiment of a reusable and returnable container;

FIG. 15 is a perspective view of the container of FIG. 14 showing the dunnage inside the container;

FIG. 16 is an enlarged perspective view of a portion of the container shown in FIGS. 14 and 15;

FIG. 17 is a partial cross-sectional view of a portion of the container shown in FIG. 14;

FIG. 18 is a perspective view of another embodiment of a reusable and returnable container;

FIG. 19 is a perspective view of the container of FIG. 18 turned upside down;

FIG. 20 is a perspective view of another embodiment of a reusable and returnable container;

FIG. 20A is a perspective view of another embodiment of a reusable and returnable container;

FIG. 20B is a perspective view of another embodiment reusable and returnable container;

FIG. 21 is a perspective view of the container of FIG. 20 showing the dunnage and four corner supports which may be used inside any of the containers;

FIG. 22 is an enlarged perspective view of a portion of the interior of the container of FIG. 20 showing a corner inside the container;

FIG. 23A is a cross-sectional view of the container shown in FIG. 20 fully loaded with products showing an upper level of products being removed;

FIG. 23B is a cross-sectional view of the container shown in FIG. 24A showing a second level of products being removed;

FIG. 23C is a cross-sectional view of the container shown in FIG. 20 empty showing products being inserted;

FIG. 23D is a cross-sectional view of the container shown in FIG. 23B showing additional products being inserted;

FIG. 24 is an enlarged cross-sectional view of a portion of the container shown in FIG. 20;

FIG. 25 is a perspective view of another embodiment of a reusable and returnable container;

FIG. 26 is a perspective view of another embodiment of a reusable and returnable container;

FIG. 26A is a perspective view of another embodiment of a reusable and returnable container;

FIG. 26B is a perspective view of another embodiment of a reusable and returnable container;

FIG. 27 is a perspective view of the container of FIG. 26 showing the dunnage inside the container;

FIG. 28 is an enlarged perspective view of a portion of the container shown in FIGS. 26 and 27;

FIG. 29 is a cross-sectional view taken along the line 29-29 of FIG. 28;

FIG. 30 is a perspective view of another embodiment of a reusable and returnable container; and

FIG. 31 is an enlarged perspective view of a portion of an alternative version of end support.

#### DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIG. 1, there is illustrated a reusable and returnable container 10 according to one embodiment. The reusable and returnable container 10, as shown, comprises a body 12 having a base 14, opposed side walls 16, a front wall 18 and a rear wall 20, all of the walls or side structures

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extending upwardly from the base 14. Two or more of the walls or sides 16, 18 and 20 may or may not be hinged secured to the base 14.

The base 14 has an upper surface which functions as a floor 22 of the interior 24 of the container. If desired one or more pieces of material (not shown) may be located on top of the container floor 22, such as cushioning materials for example. Each of the side walls 16 has an inner surface 26. The rear wall 20 has an interior surface 28 and the front wall 18 has an interior surface 30. The floor 22, interior surfaces 26 of side walls 16 and interior surfaces 30, 28 of the front and rear walls 18, 20, respectively, define the interior 24 of the container 10. The linear distance between the interior surfaces 26 of the side walls 16 defines a width "W" of the interior of the container. The linear distance between the interior surfaces 30, 28 of the front and rear walls 18, 20, respectively, defines a length "L" of the interior 24 of the container 10. See FIG. 1.

The present invention is not intended to limit the size or configuration of the container base and walls. Although one type of container is illustrated, the present invention may be used with other types or configurations of container.

Container 10 further comprises a pair of spaced stationary supports 32 operatively coupled to the rear wall 20 of the container 10 (only one being shown in FIG. 1). For purposes of this document, operatively coupled means directly or indirectly connected or coupled. FIG. 2 illustrates a pair of spaced stationary supports 32 operatively coupled to the front wall 18 of the container 10. Each of the supports 32 do not move during the loading or unloading processes. Each support 32 is illustrated in the embodiment shown in FIGS. 1-4 to be a guide eye, such as an eye bolt fixedly secured to a container wall. However, as shown in the alternative embodiments and described herein, these supports may assume other geometries or configurations. Although the drawings illustrate a pair of spaced supports 32 operatively coupled to each of the front and rear sides 18, 20 of the container 10, any number of supports may be operatively coupled to the sides of the container.

As shown in FIG. 3, each of the supports or guide eyes 32 extends through the container side structure and may be secured in place with a nut 34 and washers 36 on each side of the container side structure.

As shown in FIGS. 1-4, container 10 further comprises two guides 40. One of the guides 40 extends through an opening 38 through each of the supports or eye bolts 32 secured to the rear wall 20 of the container 10. Similarly, as best shown in FIG. 2, the second guide 40 extends through an opening 38 of each of the supports or eye bolts 32 secured to the front wall 18 of the container 10. As shown in FIG. 3, each of the guides 40 has a length greater than the width "W" of the interior 24 of the container 10. Therefore, as shown in FIGS. 3 and 4, each guide 40 has opposed end portion 42 (only one being shown). As shown in FIGS. 3 and 4, each end portion 42 of each guide 40 extends into a bore 44 in one of the container side walls 16. As shown in FIGS. 3 and 4, a washer 46 is located inside the container side wall 16 surrounding the guide 40. As best shown in FIG. 3, a holder 48 in the form of a triangular metal wire has two ends 50 which fit into holes in the guide 40. The holder 48 at each end of each guide 40 functions to hold each guide 40 in place. The pair of holders 48, acting in concert, functions to prevent the guide 40 from separating from the container side walls 16. As shown in FIG. 3, the holder 48 (shown on the left of the container) functions to prevent the guide 40 to which the holder 48 is secured from moving further to the left, such that the right side of the guide 40 separates from

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the opposite side wall 16. The other guide 48 proximate the side wall 16 (shown on the right of the container) functions to prevent the guide 40 from moving to the right, such that the left side of the guide 40 separates from the opposite side wall 16. Although one configuration of holder in the form of a triangular metal wire is shown and described, other types of holders, such as wires or pieces of other materials configured in other shapes, may be used.

As shown in FIG. 4, each of the guides 40 is in the form of a tube having a hollow interior 52. Although one configuration of guide in the form of a tube is shown and described, other types of guides, such as solid rods made of metal or plastic or wood, or any other desired material, may be used.

As shown in FIGS. 1-4, container 10 further comprises a lower level of dunnage 54 which may be fixedly secured to the floor 22 of the container. This lower level of dunnage 54 comprises a pair of stationary dunnage components 56 spaced from one another. Each stationary dunnage component 56 has a plurality of spaced notches 58 extending downwardly from an upper surface of the dunnage component 56. The notches 58 are for receiving and retaining products 60, as shown in FIG. 2, one of the products 60 extending between a pair of corresponding notches 58 in the stationary dunnage component 56. Although one specific shape of notch 58 is illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration of notches 58 in any of the dunnage components 56 of the lower level of dunnage 54. If desired, more than two dunnage components may comprise the lower level of dunnage 54. Alternatively, a single dunnage component or member may comprise the lower level of dunnage 54.

Although one specific shape of product 60 is illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration of product 60 shipped or stored in any of the embodiments described or shown herein. One type of product which may be used in accordance with the present invention is automobile fenders.

As shown in FIGS. 1-4, container 10 further comprises an upper level of dunnage 62 which is movable inside the interior 24 of the container. This upper level of dunnage 62 comprises a pair of movable dunnage components 64 spaced from one another. Each of the movable dunnage components 64 moves between one of the container side walls 16 and one of the supports 32. Each movable dunnage component 64 has a plurality of spaced notches 66 for receiving and retaining products 60, as shown in FIG. 6A. Although one specific shape of notch 66 is illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration of notches 66 in any of the dunnage components 64 of the upper level of dunnage 62.

As shown in FIGS. 2-4, each of the dunnage components 64 of the upper level of dunnage 62 has a main portion or body 65 having a pair of openings 68, one on each end. The body 65 is commonly made of foam, but may be made of other materials. As best shown in FIG. 4, a sleeve 70 extends through each opening 68 in the dunnage body 65 of the dunnage component 64 and moves with the dunnage component 64. Each sleeve 70 is sized to allow one of the guides 40 to extend through the sleeve 70. If desired, the sleeves 70 may be omitted.

As shown in FIGS. 2-4, each of the dunnage components 64 of the upper level of dunnage 62 also has a stiffener 72 and a liner 74, the liner 74 being between the stiffener 72 and body 65 of dunnage component 64. As best shown in FIG. 4, the stiffener 72 and liner 74 of the upper dunnage component 64 are each generally "U-shaped" and fit around

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a lower portion of the body or dunnage body 65 of upper dunnage component 64. The stiffener 72 may be made of foam, metal and/or plastic and provides rigidity in two directions to the dunnage component 64. The liner 74 may be made of metal and/or plastic and provides rigidity in two directions to the dunnage component 64. As shown in FIG. 3, fasteners 76 secure the body 65 of upper dunnage component 64, the liner 74 and stiffener 72 together. If desired, the stiffener 72 and/or liner 74 of the upper dunnage component 64 may be omitted.

FIG. 5 illustrates an alternative upper dunnage component 64a comprising a body or main portion 65 having notches 66 identical to the main body portion 65 of upper dunnage component 64 of FIGS. 1-4. However, each upper dunnage component 64a has no generally "U-shaped" liner or stiffener at the bottom thereof. Instead upper dunnage component 64a has a stiffener 78 in the form of a block located inside the interior of the body 65 of upper dunnage component 64a and held therein by fastener 80, as shown in FIG. 5. The stiffener 78 may be made of plastic, aluminum steel, fiber, glass or any other stiffening material. Any of the dunnage components shown or described herein may be used in upper or lower levels of any embodiment of container shown or described herein.

FIG. 3A illustrates an upper dunnage component 114 which may be incorporated into any container in place of one of the dunnage components 64. Each of the upper dunnage components 114 has notches 116 identical to the notches 66 of upper dunnage component 64. However, each upper dunnage component 114 has no liner or stiffener. Each dunnage component 114 is a one-piece unitary body made of foam, rubber, wood or any other suitable material. These dunnage components 114 may be used in upper or lower levels of dunnage of any of the embodiments of container shown or described herein. Although one specific shape of notch 116 is illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration of notches 116 in any of the dunnage components 114 of the upper level of dunnage 62 or any of the levels of dunnage.

FIG. 3B illustrates an upper dunnage component 114a which may be incorporated into any container in place of one of the dunnage components 64 or dunnage components 114 shown in FIG. 3A. Each of the upper dunnage components 114a has a specific geometry for a particular part or product, in this case, a plurality of spaced protrusions 118 between recesses or valleys 119. The protrusions 118 may be configured or sized to fit into one or more recesses (not shown) of a product 60', shown in dashed lines in FIG. 3A, to reduce the likelihood of the product 60' moving, shifting or separating from the dunnage and getting damaged during shipment. In other words, the specific configuration of the dunnage components may be shaped or configured to secure products in place so as to reduce the chances of the products getting damaged during shipment. Like upper dunnage component 114 shown in FIG. 3A, each upper dunnage component 114a has no liner or stiffener. Each upper dunnage component 114a is a one-piece unitary body made of foam, rubber, wood or any other suitable material. These dunnage components 114a may be used in upper or lower levels of dunnage in any of the embodiments of container shown or described herein. Although one specific shape of protrusion 118 is illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration of protrusions 118 in any of the dunnage components 114a of the upper level of dunnage 62 or any of the levels of dunnage. If desired, the unitary dunnage component 114a shown in FIG. 3B may be incorporated into

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a dunnage component having one or more liners or stiffeners in accordance with the present invention.

FIG. 3C illustrates a dunnage component 114b which may be incorporated into any container in place of any of the dunnage components shown or described herein. Each of the dunnage components 114b may have a specific geometry for a particular part or product; in this case, a plurality of spaced protrusions 118 between recesses or valleys 119. The protrusions 118 may be configured or sized to fit into one or more recesses (not shown) of a product 60', shown in dashed lines in FIG. 3C, to reduce the likelihood of the product 60' moving, shifting or separating from the dunnage and getting damaged during shipment, to other words, the specific configuration of the dunnage components may be shaped or configured to secure products in place so as to reduce the chances of the products getting damaged during shipment. Unlike dunnage components 64, 114, 114a shown in FIGS. 3, 3A, 3B, respectively, each dunnage component 114b has no opening therethrough. Instead, each dunnage component 114b comprises a one-piece unitary body made of foam, rubber, wood or any other suitable material to which is secured a sleeve 70 with a bracket 71 and fastener 73. Although one type of bracket 71 is shown, any known bracket may be used. Similarly, although one particular sleeve 70 is illustrated, other types of sleeves may be used. Sleeve 70 is sized to allow one of the guides 40 to extend through the sleeve 70 regardless of whether the sleeve 70 is inside or outside the body of the dunnage component. These dunnage components 114b may be used in upper or lower levels of dunnage in any of the embodiments of container shown or described herein. Although one specific shape of protrusion 118 is illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration of protrusions 118 in any of the dunnage components 114b. If desired, a sleeve and bracket-like sleeve 70 and bracket 71 may be incorporated into any of the dunnage components described or shown herein. For example, a dunnage component, like dunnage component 114 shown in FIG. 3A, may lack an opening therein, the sleeve 70 being secured to the body of the dunnage component 114 with a bracket or via any other suitable manner.

FIG. 3D illustrates another dunnage component 114c which may be incorporated into any container in place of one of the dunnage components shown or described herein. Each upper dunnage component 114c has no opening therethrough, instead, each upper dunnage component 114c comprises a one-piece unitary body made of foam, rubber, wood or any other suitable material to which is secured a slider 115 like those described and shown in U.S. Pat. No. 7,762,422, which is fully incorporated herein. Although one type of slider 115 is shown, any other shaped slider may be used. Slider 115 is sized to move along a track 117 like tracks shown in U.S. Pat. No. 7,762,422. These dunnage components 114c and tracks 117 may be used in upper or lower levels of dunnage in any of the embodiments of container shown or described herein. Although one specific shape of track 117 is illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration of tracks 117 in any of the levels of dunnage. If desired, the tracks 117 may be the full width of the interior of the container.

FIGS. 6A-6C illustrate a method of unloading product 60 from a fully loaded container 10. The method comprises the first step of pulling product 60 extending between the two dunnage components 64 of the upper level or layer of dunnage 62 out of the dunnage in the direction of arrow 61. As shown in FIG. 6B, the two dunnage components 64 of the

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upper level or layer of dunnage 62 are then moved outwardly away from each other in the direction of arrows 63. More specifically, an operator moves them from a first or closed position shown in FIG. 6A to a second or open position illustrated in FIG. 6B. As shown in FIG. 6B, when the two dunnage components 64 of the upper level of dunnage 62 are in their second or open position, the opening therebetween is greater than when they are in the first or closed position illustrated in FIG. 6A. As shown in FIG. 6C, the next step comprises removing product 60 extending between the dunnage components 56 of the lower level of dunnage 54, the two dunnage components 64 of the upper level of dunnage 62 remaining in their second or open position. With the dunnage components 64 of the upper level of dunnage 62 being in their second or open position, products 60 in the lowermost level of dunnage 54 may be more easily removed from the container in the direction of arrow 67 without the dunnage components 64 of the upper level of dunnage 62 being in the way or obstructing the removal of the lower level of products though the opening.

FIGS. 6D-6F it a method of loading product 60 into an empty container 10. As shown in FIG. 6D, products 60 are loaded into the container's interior 24 by the operator in the direction shown by arrow 82 between the dunnage components 64 of the upper level of dunnage 62 (which are in their open position). Thus, products 60 are loaded into the lower level of dunnage 54 and, more specifically, loaded such that each product 60 extends between the dunnage components 56 of the lower level of dunnage 54. As shown in FIG. 6E, once the lower level of dunnage 54 is full of product 60, the two dunnage components 64 of the upper level or layer of dunnage 62 are then moved inwardly towards each other in the direction of arrows 84. More specifically, an operator moves them from a second or open position shown in FIG. 6D to a first or closed position illustrated in FIG. 6F. The distance they travel inwardly is limited by the location of the supports 32. Each of the dunnage components 64 of the upper level of dunnage 62 does not travel between the supports 32. In other words, each of the dunnage components 64 of the upper level of dunnage 62 does not travel inside the support 32 closest to it. As shown in FIG. 6F, the last step of the method comprises loading product 60 into the upper level or layer of dunnage 62 in the direction of arrow 86, each product 60 extending between the two dunnage components 64 of the upper level or layer of dunnage 62.

Although FIGS. 6A-6F illustrate methods of loading and unloading product into container 10 having two guides 40, these methods may be used in any of the embodiments shown or described herein. For example, the upper components may be moved in the same manner using the container 10a having the shorter guides 40a. Although one configuration of container is shown and described with respect to the method, the method may be practiced with any container shown or described herein.

FIGS. 7, 8 and 9 illustrate an alternative embodiment of container 10a. Container 10a is identical to container 10 except for the guides. Rather than having two guides 40, each having a length greater than the width "W" of the interior 24 of the container 10, container 10a has four guides 40a. Two of the four guides 40a are front guides, and two are rear guides, each guide 40a being shorter in length than the width "W" of the interior 24 of the container 10a. In this embodiment, one of the rear guides 40a extends between one of the side walls 20 and a support 32 operatively coupled to rear wall 20. The other rear guide 40a extends between the other side wall 20 and the other support 32 operatively coupled to rear wall 20. Similarly, as shown in FIG. 8, each

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of the front guides **40a** extends from one of the container side walls **16** to the nearest support **32**. As shown in FIG. 9, each guide **40a** extends through an opening **38** through one of the supports or eye bolts **32** operatively coupled to the front or rear wall **18**, **20** of the container **10**. As shown in FIG. 9, each guide **40a** has opposed end portions **42a**. As shown in FIG. 9, one end portion **42a** of each guide **40a** extends into a bore **44** in one of the container side walls **16**. As shown in FIGS. 8 and 9, a washer **46** is located inside the container side wall **16** surrounding the guide **40a**. A holder **48**, like the holder **48** shown in FIG. 3, is secured to the guide **40a** inside the washer **46**. As best shown in FIG. 9, two holders **48** are secured to each guide **40a**. Each holder **48** is in the form of a triangular metal wire and has two ends **50** which fit into holes in the guide **40a**. The holders **48** function to hold each guide **40a** in place. The pair of holders **48**, acting in concert, functions to prevent the wide **40** from separating from one of the container side walls **16** and from separating from one of the supports **32**. As shown in FIG. 9, the holder **48** (shown on the left of the container) functions to prevent the guide **40a** from moving further to the left, such that the right side of the guide **40a** separates from the nearest support **32**. The other guide **48** located inside the support **32** (shown on the right in FIG. 9) functions to prevent the guide **40a** from moving to the right, such that the left side of the guide **40a** separates from the side wall **16**.

As shown in FIG. 9, each of the guides **40c** is in the form of a tube having a hollow interior **52a**. Although one configuration of guide in the form of a tube is shown and described, other types of guides, such as solid rods or beams made of metal or plastic or wood, or any other desired material, may be used if desired.

FIGS. 10, 11, 12 and 13 illustrate an alternative embodiment of container **10b**. Container **10b** is similar to container **10a** and uses the same dunnage and same four guides **40a**. In this embodiment, two of the four supports **32b** are operatively coupled to rear wall **20** below a section **88** which may be removable or a drop down door. Although not shown, the other two of the four supports **32b** are operatively coupled to front wall **18** below another section **88** which may be removable or a drop down door. As shown in FIG. 11, each of the container walls may have a removable section or door **88**. FIG. 11 illustrates the removable section **88** of rear wall **20** being removed in the direction of arrow **90**. Alternatively, one or more of the wall sections **88** may be hinged to the remainder of the container wall, side or side structure and function as a door.

As shown in FIG. 12, two of the four supports or brackets **32b** are each operatively coupled with fasteners **92** to container rear wall **20** below the section **88** so as to not interfere with the removal or lowering of the wall section **88** of rear wall **20**. The other two supports **32b** are operatively coupled to the front container wall **18** below the section **88** so as to not interfere with the removal or lowering of the wall section **88** of front wall **18**. As shown in FIG. 12, each of the supports **32b** has a generally planar first portion **94** and a generally planar second portion **96** extending outwardly from the first portion **94**. As shown in FIGS. 12 and 13, the second portion **96** of each support or bracket **32b** has a holder **98** on an outer surface thereof. Each holder **98** is sized to receive and retain one end of one of the guides **40a**, as best illustrated in FIG. 12. As shown in FIGS. 12 and 13, the other end of each guide **40a** extends into an opening **100** in a flange **102** located in a bracket **104** secured to one of the container side walls **16**. As shown in FIGS. 12 and 13, fasteners **106** are used to secure the bracket **104** to one of the container side walls **16**.

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FIGS. 14-17 illustrate an alternative embodiment of container **10c**. Container **10c** is similar to container **10a** and uses the same dunnage and same four guides **40a**. However, in container **10c**, the supports **32c** are not eye bolts. As best shown in FIG. 15, two of the four supports **32c** are secured to rear wall **20**, and the other two of the four supports **32c** are secured to front wall **18** in any conventional manner.

As best shown in FIGS. 16 and 17, each of the supports **32c** comprises a U-shaped bracket **108** secured with fasteners **110** to a middle body **112**. As best shown in FIG. 17, the U-shaped bracket **108** contacts three sides of the body **112**. As shown in FIG. 17, the guide **40a** passes through an opening in one all of the bracket **108** (the innermost wall) and through the body **112** of the support **32c**. Thus, each support **32c** is sized to receive and retain one end of one of the guides **40a**, as best illustrated in FIG. 17. As shown in FIGS. 16 and 17, the other end of each guide **40a** extends into a bore **44** in one of the container side walls **16**. As shown in FIGS. 3 and 4, a washer **46** is located inside the container side wall **16** surrounding the guide **40a**. As best shown in FIG. 16, a holder **48** in the form of a triangular metal wire has two ends **50** which fit into holes in the guide **40a**. The holder **48** at one end of each guide **40a** functions to hold each guide **40a** in place. The holder **48** helps prevent the guide **40a** from moving to the left, as shown in FIG. 16 and discussed herein. The other end of guide **40a** passes through one of the sides of bracket **108** and through the body **112** of the support **32c**, abutting the opposed side of bracket **108**.

FIGS. 18-19 illustrate an alternative embodiment of container **10d**. Container **10d** is similar to container **10c** shown in FIGS. 14-17 in that container **10d** uses the same dunnage, guides **40a** and supports **32c** as container **10c**. However, in container **10d**, the side structures are not solid walls. As best shown in FIG. 18, container **10d** comprises an outer metal rack or frame **120** having a bottom **122** and four corner posts, two rear corner posts **124** and two front corner posts **126**. As best shown in FIG. 19, each of the corner posts **124** and **126** is generally rectangular in cross-section, has a hollow interior, and a knob **128** at the top thereof for stacking purposes so that multiple containers **10d** may be stacked upon one another. The knobs **128** of a first container fit inside the hollow interiors of the corner posts of another or second container located above the first container for stacking purposes. If desired, each of the corner posts may have a cap **130** at the bottom thereof (only one being shown in FIG. 18).

The metal frame **120** further comprises an upper rear member **132** and a lower rear member **134** (see FIG. 19) extending between the two rear corner posts **124** and being secured thereto. Two spaced intermediate rear braces **136** extend between the upper and lower rear members **132**, **134** and are secured thereto, such as by welding, for example. As shown in FIG. 18, two of the four supports **32c** are welded or otherwise secured to the intermediate rear braces **136** (one support **32c** per intermediate rear brace **136**). The other two supports **32c** are welded or otherwise secured to the vertical members **164** of the front gates **160** described below (one support **32c** per vertical member **164**). An intermediate rear panel **138** extends between the two rear corner posts **124** and is secured thereto. These rear members **132**, **134**, rear panel **138** and rear corner posts **124** define a rear portion or structure **140** of the metal frame **120**, intermediate rear panel **138** being above lower rear member **134**.

The metal frame **120** further comprises, on each side of the container, side members **142**, **144** and **146** extending between one of the rear corner posts **124** and one of the front corner posts **126** and secured thereto. On each side, upper

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side member 142 is located above intermediate side member 144 and generally co-planar with the upper rear member 132, as shown in FIG. 18. On each side, intermediate side member 144 is located above lower side member 146, lower side member 146 being generally co-planar with the lower rear member 134. As shown in FIG. 18, the four guides 40a are secured to the intermediate side members 144, two per side. In addition, each side has a side panel 146 extending between and secured to one of the rear corner posts 124 and one of the front corner posts 126. The side members 142, 144 and 146, side panel 148 and corner posts 124, 126 define a side portion or structure 150 of the metal frame 120.

As best shown in FIG. 19, the bottom 122 of the metal rack 120 further comprises generally coplanar perimeter members defining a rectangle, including lower rear member 134, two lower side members 146 and front floor member 152. Front floor member 152 extends between the two front corner posts 126 and is secured to each of them. Bottom 122 of the metal rack 120 further comprises a plurality of intersecting interior members 154 extending between opposed perimeter members and secured thereto, members 154 comprising part of the bottom 122 of the metal rack 120. Although four interior members 154 are shown in the bottom 122 of the metal rack 120, any number of interior members may be used. Similarly, although the rear and side portions 140, 150 of the metal rack 120 are illustrated as having a certain number of braces or members extending between corner posts, any number of braces or members may extend between corner posts of any desired shape or size.

A floor 156 rests on top of the bottom of the metal outer frame 120. If desired one or more pieces of material (not shown) may be located on top of the container floor 156, such as cushioning materials for example. The floor 156 may be made of plastic, wood, metal or any other desired material. Although the floor 156 is illustrated as being one piece or panel, more than one piece or panel may comprise the floor 156 resting on top of the bottom 122 of the metal rack 120.

The metal frame 120 further comprises two front gates 160, one on each side of the container 10d. Each front gate 160 comprises a horizontal member 162 secured to one of the front corner posts 126 and being generally co-planar with the upper side members 142 and upper rear member 132. Each front gate 160 further comprises a vertical member 164, the horizontal member 162 and the front floor member 152.

Although the outer metal rack or frame 120 is shown only in FIGS. 18 and 19 with guides 40a and supports 32c, any of the dunnage systems shown or described herein may be used in a container having an outer metal rack or frame like the outer metal rack or frame 120.

FIGS. 20 and 21-24 illustrate another embodiment of container 10e. Container 10e, as shown, comprises a body 170 having a base 172, a front wall 173, a rear wall 175 and two sides or side structures 174, all extending upwardly from the base 172. As shown in FIG. 20, each of the sides or side structures 174 may have a movable door 171 to facilitate insertion or removal of products 260. Two or more of the walls or sides may or may not be hingedly secured to the base 172. Each of the doors 171 may be lowered in any known manner. Although one style and size of door is illustrated, any known door of any size may be used in accordance with any of the containers shown or described herein.

FIG. 20A illustrates another embodiment of container 10ee similar to container 10e except the front and rear sides

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or walls 173, 175 of the container have doors 171, as opposed to the side was 174 having doors, as shown in the embodiment of FIG. 20.

FIG. 20B illustrates another embodiment of container 10eee similar to container 10ee except the container has no movable doors 171. Instead of doors, container 10eee has two cut-outs or openings 177, one in the front wall 173 and one in the rear wall 175. Although not shown, the side walls 174 may have cut-outs or openings.

As shown in FIG. 21, the base 172 of container 10e has an upper surface 202 which may function as a floor of the interior 204 of the container 10e. If desired, one or more pieces of material (not shown) may be located on top of the container floor 202, such as cushioning materials, for example. As shown in FIG. 20, each of the container sides 174 has an inner surface 206. As shown in FIG. 20, the floor 202 and interior surfaces 206 of sides 174 define the interior 204 of container 10e. The linear distance between the interior surfaces 206 of opposed sides 174 defines a width "W1" of the interior 204 of container 10e. The linear distance between the interior surfaces 206, of the other two opposed sides 174, defines a length "L1" of the interior 204 of container 10e. As shown in FIGS. 20A and 20B, the same true of container 10ee of FIG. 20A and container 10eee of FIG. 20B.

As best shown in FIG. 21, the interior of container 10e (and containers 10ee and 10eee) comprises four stationary corner supports 176. As shown in FIG. 22, each corner support 176 is operatively coupled to two adjacent walls or sides of the container 10e with fasteners 179 (only two fasteners 179 being shown). As best seen in FIG. 22, each fastener 179 extends through an opening 182 in each corner support 176. Each of the corner supports 176 is generally U-shaped in cross-section, having a central portion 178 and two side portions 180. Each side portion 180 is oriented generally orthogonal to the central portion 178. Each corner support 176 is preferably made of metal, but may be made of any suitable material. Each of the corner supports 176 does not move during the loading or unloading processes. Although a certain number of openings 182 are illustrated in the central portion 178 and outer side portion 180 of each corner support 176, the drawings are not intended to be limiting. Any number of openings of any desired size may be incorporated into each corner support 176 to help secure the corner support 176 to the walls or sides (outer shell) of the container 10e or container 10ee or container 10eee) with fasteners 179. Alternatively, the fasteners may extend through the central portion 178 and outer side portion 180 of each corner support 176, thereby eliminating the need for openings in the corner supports.

As best shown in FIG. 22, a rectangular cushion pad 184 may be secured with fasteners 186 to an inner side portion 180 of each of the corner supports 176. As shown in detail in FIG. 24, each cushion pad 184 has a plurality of vertically spaced bores 185 therethrough. Each bore 185 is sized to allow a guide 188 to pass through the cushion pad 184 at the proper location. Each cushion pad 184 may be made of foam, fiber, rubber or any other cushioning material to prevent damage to products or parts being shipped.

As shown in FIGS. 20-24, container 10e (or any other container shown or described herein, including containers 10ee and 10eee) further comprises multiple guides 188 at each level. In the illustrated embodiment, four pare lei guides 188 are located at each level; two at the front and two at the rear of the container 10e. As best shown in FIG. 22, each of the guides 188 extends through aligned openings 190 through the side portions 180 of each corner support



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176. As best shown in FIGS. 20 and 22, each of the guides 88 has a length greater than the width "W2" of the interior of the corner support 176. Therefore, as best shown in FIG. 22, each guide 188 has an enlarged head or end portion 192 which is too big to pass through one of the openings 190. As shown in FIG. 22, the head 192 of each guide 188 is located between one of the container sides 174 and an outer side portion 180 of a corner support 176, thereby eliminating the need to secure the guide 188 to the container. As best shown in FIG. 22, the opposite end of the guide 188 extends through one of the holes 190 in the other side portion 180 of the corner support 176. Although no holder such as a cotter pin or triangular wire, etc. is illustrated tending through the guide 188, such a holder may be used to prevent movement of a guide 188.

As shown in FIG. 24, each of the guides 188 is in the form of a tube having a hollow interior 198. Although one configuration of guide in the form of a tube is shown and described, other types of guides, such as solid rods made of metal or plastic or wood, or any other desired material, may be used. The guide need not have a circular cross-section; it may be any desired shape in cross-section as long as the openings in the side portions 180 of the corner supports 176 match.

As shown in FIGS. 21 and 23A-230, container 10e further comprises a bottom level of dunnage 200 supported by the floor 202 of the container 10e. This bottom level of dunnage 200 may be fixedly secured directly or indirectly to the floor 202 of the container 10e. In the illustrated embodiment, this bottom level of dunnage 200 comprises a pair of stationary dunnage components 208 spaced from one another. As best shown in FIG. 21, each stationary dunnage component 208 has a plurality of spaced notches 210 and a plurality of spaced projections 212. The notches 210 are for receiving and retaining products 260, as shown in FIG. 20, one of the products 260 extending between as pair of corresponding notches 210 in the stationary dunnage components 208. Although one specific shape of notch 210 is illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration or notches 210 in any of the dunnage components 208 of the lower level of dunnage 200. If desired, more than two dunnage components may comprise the lowest or bottom level of dunnage 200. Alternatively, a single dunnage component or member may comprise the lowest level of dunnage. In some applications, the bottom level of dunnage may be movable and include guides like all the other levels of dunnage. Although the stationary dunnage components 208 are illustrated in FIG. 21 being spaced from each other the same distance as the movable dunnage components when the movable dunnage components are moved inwardly, the stationary dunnage components 208 may be closer together or further apart than illustrated in FIG. 21.

Although one specific shape of product 260 is illustrated this document is not intended to limit in any way the size, shape or configuration of product 260 shipped or stored in any of the embodiments described or shown herein. One type of product which may be used in accordance with the present invention is automobile fenders.

As shown in FIGS. 20-24, container 10e further comprises multiple levels of movable dunnage 214 above the bottom dunnage level 200. Although FIG. 21 illustrates four levels of movable dunnage 214, any number of levels of movable dunnage may be inside any of the containers shown or described herein. As best shown in FIG. 21, each movable level of dunnage 214 comprises a pair of movable dunnage components 216 spaced from one another. Each movable

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dunnage component 216 of each level of movable dunnage 214 is movable inside the interior 204 of the container 10e (or other containers illustrated or described herein, such as containers 10ee and 10eee) between open and closed positions. FIGS. 21 and 22 illustrate each movable dunnage component 216 in a closed position. As best illustrated in FIG. 22, each of the movable dunnage components 216 moves between one of the side portions 180 of a corner support 176 (attached to one of the container sides 174) and one of the cushion pads 184. When the movable dunnage component 216 is adjacent one of the side portions 180 of a corner support 176, as shown in FIG. 23C, movable dunnage component 216 is considered in its open position. When the movable dunnage component 216 is adjacent one of the cushion pads 184 attached to the other side portion 180 of a corner support 176, as shown in FIG. 23A, the movable dunnage component 216 is considered in its closed position.

Each movable dunnage component 216 is shown being identical to one of the stationary dunnage components 208 of the bottom dunnage level 200, but with additional components described herein. However, the movable dunnage components 216 may differ in shape and/or configuration than the bottom dunnage components 208. Like the bottom dunnage components 208, each movable dunnage component 216 has a plurality of spaced notches 210 and a plurality of spaced projections 212 for receiving and retaining products 260 in the notches 210, as shown in the drawings.

Although one specific shape of notch 210 and projection 212 are illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration of notches and/or projections in any of the dunnage components of any of the dunnage levels. For example, the dunnage components may be made partially or entirely of wire, may comprise pouches or may have openings therein to receive and retain portions of products.

As shown in FIG. 24, each of the movable dunnage components 216 of a movable level of dunnage 214 has a main portion or body 218 having a bore 220 therethrough. The body 218 is commonly made of foam, but may be made of other materials. As best shown in FIG. 24, a sleeve 222 may extend through bore 220 in the dunnage body 218 of the movable dunnage component 216. The sleeve 222 moves with the dunnage component 216. Each hollow sleeve 222 is sized to allow one of the guides 188 to extend through the sleeve 222. If desired, the sleeves 222 may be omitted, in which case one of the guides 188 would pass directly through a bore in the dunnage body 218.

As shown in FIGS. 22 and 24, one or more of the movable dunnage components 216 of a movable level of dunnage 214 may have a stiffener 224 and a cushion 226. The stiffener 224 is located between the cushion 226 and body 218 of dunnage component 216. As shown in FIG. 24, a glue layer 230 may be located between the lower surface of the body 218 and the stiffener 224 to secure them together. As best shown in FIG. 24, the stiffener 224 and cushion 226 of the movable dunnage component 216 are each generally "U-shaped" and fit around a lower portion of the body 218 of movable dunnage component 216. The stiffener 224 may be made of foam, metal and/or plastic and provides rigidity in two directions to the dunnage component 216. The cushion 226 may be partially or entirely made of foam and/or plastic. Each cushion 226 prevents products 260 from damage, such as being scratched while being loaded and/or unloaded. As shown in FIGS. 22 and 24, threaded fasteners 228, such as drywall screws, may secure the body 218 of movable dunnage component 216, the stiffener 224 and cushion 226 together. Other known means, including addi-

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tional adhesive, may be used to secure the body **218** of movable dunnage component **216**, the stiffener **224** and cushion **226** together with or without the fasteners **228**. If desired, the stiffener **224** and/or cushion **226** of the movable dunnage component **216** may be omitted.

FIGS. **23A-23B** illustrate a method of unloading products **260** from a fully loaded container **10e** (or any other container illustrated or described herein). The method comprises the first step of pulling products **260** extending between the two dunnage components **216** of the top level or layer of dunnage **214** out of the upper level of dunnage and out of the container **10e** in the direction of arrow **232**. As shown in FIG. **23B**, the two movable dunnage components **216** of the top level or layer of dunnage **214** are then moved outwardly away from each other in the direction of arrows **234**. More specifically, an operator moves them from a first or closed position shown in FIG. **23A** to a second or open position illustrated in FIG. **23B**. As shown in FIG. **23B**, when the two dunnage components **216** of the top level of dunnage **214** are in their second or open position, the opening therebetween greater than when they are in the first or closed position illustrated in FIG. **23A**. When one or both of the dunnage components **216** are moved away from each other, access to a lower level of dunnage is improved and helps prevent undesirable damage to the products being removed from the interior of the container. The increased spacing between the movable dunnage components also makes unloading lower products easier from an ergonomic standpoint, thereby improving worker efficiency and productivity.

As shown in FIG. **23B**, the next step comprises removing a second level of products **260** extending between the movable dunnage components **216** of the next lowest level of movable dunnage **214**, the two dunnage components **216** of the top level of dunnage **214** remaining in their second or open position. With the dunnage components **216** of the upper level of dunnage **214** being in their second or open position, products **260** in the next level of movable dunnage **214** may be more easily removed from the container in the direction of arrow **236** without the dunnage components **216** of the upper level of dunnage **214** being in the way or obstructing the removal of the lower level of products though the opening. This process is repeated one level at a time moving downwardly until products **260** supported by the lowest or bottom level of stationary dunnage **200** are removed from inside the container **10e**. Alternatively, only one side of movable dunnage components **216** may be moved and the other side remains stationary during either the loading or unloading process.

FIGS. **23C-23D** illustrate a method of loading products **260** into an empty container **10e**. As shown in FIG. **23C**, products **260** are loaded into the container's interior **204** by an operator in the direction shown by arrow **238** between the movable dunnage components **216** of multiple levels of movable dunnage **214** (which are in their open position). Thus, products **260** are loaded into the lowest or bottom level of dunnage **200** and, more specifically, loaded such that each product **260** extends between the stationary dunnage components **208** of the lowest or bottom level of dunnage **200**. As shown in FIG. **23D**, once the lowest level of dunnage **200** contains the desired number of products **260**, the two movable dunnage components **216** of the next highest level or layer of dunnage **214** are then moved inwardly towards each other in the direction of arrows **240** to a closed position. More specifically, an operator moves them from a second or open position shown in FIG. **23C** to a first or closed position illustrated in FIG. **23D**. The distance movable dunnage components **216** travel inwardly

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is limited by the size and location of corner supports **176** and cushion pads **184**. Each of the movable dunnage components **216** of the upper level of dunnage **214** does not travel between the cushion pads **184**. In other words, each of the movable dunnage components **216** of a movable level of dunnage **214** does not travel inside the cushion pad **184** closest to it. This step of loading products **260** into levels one at a time (moving upwardly) by inserting the products **260** in the direction of arrow **242** continues until the container **10e** is full.

FIG. **25** illustrates an alternative embodiment of container **10f**. Container **10f** is similar to container **10e** shown in FIGS. **20-24** in that container **10f** uses the same dunnage and corner supports **176** as container **10e**. However, in container **10f**, the container side structures are not solid walls. The outside or shell of the container is considered a rack structure, typically made of metal. Although the rack **244** shown in FIG. **25** is one configuration, the drawings are not intended to limit the style of rack used in accordance with the invention. For example, the rack or frame **120** shown in FIGS. **18** and **19**, or any similar metal rack, may be used in place of the rack or frame **244** shown in FIG. **25**.

Although one configuration of outer metal rack or frame **244** of container **10f** is shown in FIG. **25**, other configurations of outer metal racks may be used in accordance with the inventions described herein. Any of the dunnage systems shown or described herein may be used in any container having an outer metal rack or frame, including but not limited to, the outer metal rack or frame **244** shown in FIG. **25**.

As shown in FIG. **25**, container **10f** further comprises multiple guides **188** at each level. As best shown in FIG. **25**, each of the guides **188** extends through aligned openings **190** through the side portions **180** of each corner support **176**. As best shown in FIG. **25**, each of the guides **188** has a length greater than the width of the interior of the corner support **176**. As shown in FIG. **25**, each guide **188** has one head **192** (only one side being shown in FIG. **25**) located outside the outer wall **180** of one of the corner supports **176**. As best shown in FIG. **5**, a holder **196** (shown in the form of a cotter pin just inside the inner side portion **180** of each corner support **176**) may extend through an opening in the guide **188** to prevent lateral movement of the guide **188**. One holder **196** and the head **192** function to hold each tubular guide **188** in place. Although not shown a pair of holders **196**, acting in concert, may function to prevent a guide **188** lacking a head **192** from separating from the container. Although one configuration of holder in the form of a cotter pin is shown and described, other types of holders, such as triangular wires or pieces of other materials configured in other shapes, may be used as holders to prevent movement of the guides **188**, which may be any desired shape in cross-section.

Each of the guides **188**, like each of the guides **40** shown in FIG. **4**, may be in the form of a tube having a hollow interior. Although one configuration of guide in the form of a tube is shown and described, other types of guides, such as solid rods made of metal or plastic or wood, or any other desired material, may be used.

FIGS. **26-29** illustrate another embodiment of container **10g**. Container **10g**, as shown, comprises the same body **170** shown in FIG. **20** and described above. As best shown in FIG. **27**, the interior **248** of container **10g** (and containers **10gg** and **10ggg**) comprises four stationary end supports **246**, in place of four corner supports **176** shown in the containers of FIGS. **20-25**. Furthermore the container **10g**

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(and container 10gg and container 10ggg) lack guides 188, 189 shown in the containers of FIGS. 20-25.

FIG. 26A illustrates another embodiment of container 10gg identical to container 10g except the front and rear sides or walls 173, 17, of the container have doors 171, as opposed to the side walls 174.

FIG. 28B illustrates another embodiment of container 10ggg identical to container 10gg except the container has no doors 171. Instead of doors, container 10ggg has two cut-outs or openings 177, one in the front wall 173 and one in the rear wall 175. Although not shown, the side walls 174 may have cut-outs or openings.

As best shown in FIG. 27, the interior of container 10g (and containers 10gg and 10ggg) comprises four stationary end supports 246. As shown in FIG. 27, two end supports 246 are operatively coupled or secured to each of the front and rear walls 173, 175 of the container with fasteners 179 (only one fastener 179 being shown in FIG. 28). Alternatively, the end supports may be secured to the side walls orienting the dunnage ninety degrees from the orientation shown in FIGS. 26 and 27. As best seen in FIG. 28, each fastener 179 extends through an opening 250 in each end support 246 and into one of the container sides or walls. As best seen in FIG. 28, each of the end supports 246 may be a generally rectangular and generally planar unitary member, having a top edge 252, a bottom edge (not shown) and two side edges 254. Alternatively, as shown in FIG. 31 each end support may be made of multiple members. Each end support 246 is preferably made of metal, but may be made of any suitable material. Each of the end supports 246 does not move during the loading or unloading processes.

Although a certain number of openings 250 are illustrated in each end support 246, the drawings are not intended to be limiting. Any number of openings of any desired size may be incorporated into each end support 246 to help secure the end support 246 to one of the walls or sides (outer shell) of the container 10g (or container 10gg or container 10ggg) with fasteners 179. Alternatively, the fasteners may extend through each end support 246, thereby eliminating the need for openings in the end support 246.

As best seen in FIG. 28, each end support 246 has a series of vertically spaced turnouts 256, one at each level or layer. Each turnout 256 comprises a piece of material or tab 258 extending outwardly from the end support 246, the tab 258 having a linear slot 262 therein. In the embodiment shown, the material of the end support 246 is cut along a generally U-shaped pattern and then bent to a position in which it is generally perpendicular to the remainder of the end support 246, thereby leaving an opening 264 in the end support 246. Alternatively, extra material for the slotted tab may be welded in place without removing material from the remainder of the end support 246.

As shown in FIGS. 26-29, container 10g further comprises multiple levels of movable dunnage 214' above the bottom dunnage level 200'. Each level of dunnage 214' is movable inside the interior 248 of the container 10g or other containers illustrated or described herein, such as containers 10gg and 10ggg. As best shown in FIG. 27, each movable level of dunnage 214' comprises a pair of movable dunnage components 216' spaced from one another. Each movable dunnage component 216' is shown being identical to one of the stationary dunnage components 208 of the bottom dunnage level 200', but with additional components described herein. However, the movable dunnage components 216' may differ in shape and/or configuration than the bottom dunnage components 208. Like the bottom dunnage components 208, each movable dunnage component 216' has a

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plurality of spaced notches 210 and a plurality of spaced projections 212 for receiving and retaining products 260 in the notches 210, as shown in FIG. 23A. Although one specific shape of notch 210 and projection 212 are illustrated in the drawings, this document is not intended to limit in any way the size, shape or configuration of notches and/or projections in any of the dunnage components of any of the dunnage levels.

As shown in FIG. 29, each of the movable dunnage components 216' of a movable level of dunnage 214' has a main portion or body 218'. The body 218' is commonly made of foam, but may be made of other materials.

As shown in FIGS. 28 and 29, one or more of the movable dunnage components 216' of a movable level of dunnage 214' may have a stiffener 224' and a cushion 226'. The stiffener 224' is located between the cushion 226' and body 218' of dunnage component 216'. As shown in FIG. 29, a glue layer 230 may be located between the lower surface of the body 218' and the stiffener 224' to secure them together. As best shown in FIG. 29, the stiffener 224' and cushion 226' of the movable dunnage component 216' are each generally "U-shaped" and fit around a lower portion of the body 218' of movable dunnage component 216'. The stiffener 224' may be made of foam, metal and/or plastic and provides rigidity in two directions to the dunnage component 216'. The cushion 226' may be partially or entirely made of foam and/or plastic. Each cushion 226' prevents products 260' from damage, such as being scratched while being loaded and/or unloaded. As shown in FIGS. 27 and 28, threaded fasteners 228, such as drywall screws, may secure the body 218' of movable dunnage component 216', the stiffener 224' and cushion 226' together. Other known means, including additional adhesive, may be used to secure the body 218' of movable dunnage component 216', the stiffener 224' and cushion 226' together. If desired, the stiffener 224' of the movable dunnage component 216' may be omitted.

As best shown in FIG. 29, the cushion 226' of the movable dunnage component 216' has two pegs 266, one at each end, extending downwardly from a bottom portion thereof. Each peg 266 is adapted to move inside one of the slots 262 of one of the tabs 258 of one of the end supports 246. As best illustrated in FIG. 28, each of the movable dunnage components 216' moves between a closed position in which the pegs 288 of the movable dunnage component 216' (part of the cushion 226') are located at the innermost ends of the slots 262 of corresponding tabs 258 along one side of the container and an open position in which the pegs 266 of the movable dunnage component 216' (part of the cushion 226') are located at the outermost ends of the slots 262 of corresponding tabs 258 on the opposed side of the container.

FIG. 30 illustrates an alternative embodiment of container 10h. Container 10h is similar to container 10g shown in FIGS. 26-29 in that container 10h uses the same dunnage and end supports as container 10g. However, in container 10h, the container side structures are not walls, and the end supports may be welded to an outside shell of the container 10h. The outside shell of the container is considered a rack structure, typically made of metal. Although the rack 244' shown in FIG. 30 is one configuration, the drawings are not intended to limit the style of rack used in accordance with the invention. For example, the rack or frame 120 shown in FIG. 18 or any similar metal rack may be used in place of the rack or frame 244' shown in FIG. 30.

FIG. 31 illustrates an alternative configuration of end support 248' shown partially disassembled. End support 248' is made of multiple pieces 268, 269, each piece 268, 269 having multiple openings 270 adapted to receive fasteners to

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secure the end support **248'** to one of the side structures or walls of any of the containers shown or described herein. Although each piece **268** is illustrated having two openings **270**, each piece **268**, **269** may have any number of openings of any desired size or configuration.

Each piece **268** comprises a generally planar portion **272** through which the openings **270** extend and a slotted tab **274** extending outwardly from the top of the generally planar portion **272**. Each tab **274** has a linear slot **276** therein in which the pegs **266** ride. The generally planar portion **272** has two spaced, generally V-shaped projections **278** extending outwardly from a lower edge **280** of each end support piece **268**. Each projection **278** is adapted to fit into a generally V-shaped receptacle **282** formed in the generally planar portion **272** of another end support piece **268**, to prevent or inhibit movement of one end support piece **268** relative to another. Each projection and receptacle may be shapes other than those illustrated to inhibit movement between end support pieces.

Although not shown, the material of the generally planar portion **272** of end support piece **268** may be cut along a generally U-shaped pattern and then bent to a position in which it is generally perpendicular to the remainder of the end support piece **268**, thereby leaving an opening in the end support piece **268**, as shown in FIGS. **27** and **28** and described herein.

As shown in FIG. **31**, each end support piece **269** comprises a generally planar portion **284** through which the openings **270** extend, and two spaced V-shaped projections **286** extending outwardly from a lower edge **288** of each end support piece **269**. Each projection **286** is adapted to fit into a receptacle **282** formed in the generally planar portion **272** of an end support piece **268**, to prevent or inhibit movement of support pieces **268**, **269** relative to each other. Although FIG. **31** illustrates one end support piece **269** above four end support pieces **268**, other combinations are possible. For example, end support piece **269** may have openings **282** like those shown in end support pieces **268**, in which case any combination of end support pieces **268**, **269** may be joined together.

While various embodiments of the present invention have been illustrated and described in considerable detail, it is not the intention of the applicant to restrict or in any way limit the scope of the claims to such detail. Additional advantages and modifications readily appear to those skilled in the art. The invention in its broader aspect is, therefore, not limited to the specific details, representative system, apparatus, and method, and illustrative example shown and described. Accordingly, departures may be made from such details without departing from the spirit or scope of the applicant's general inventive concept.

What is claimed is:

1. A container for holding products therein during shipment, the container comprising:

a base, a front wall, a rear wall and two side walls;  
multiple levels of dunnage for holding products during storage and shipment;

four stationary corner supports, each stationary corner support being generally U-shaped in cross-section having a central portion and two side portions, the central portion and one side portion being secured to adjacent walls of the front wall, the rear wall and the two side walls of the container;

stationary guides supported by each of the stationary corner supports, each stationary guide extending between the side portions of the stationary corner support;

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wherein at least one level of dunnage comprises multiple movable upper dunnage components, the guides directing at least one of the dunnage components to a desired position away from another dunnage component at the same level to facilitate insertion and removal of products from another level of dunnage.

2. The container of claim **1** wherein a bottom level of dunnage is stationary.

3. The container of claim **1** wherein at least one of the dunnage components is made at least partially of foam.

4. The container of claim **1** wherein at least one of the dunnage components comprises multiple pieces.

5. The container of claim **1** wherein each of the guides is a rail.

6. The container of claim **1** wherein at least one of the dunnage components has a specific geometry for a particular product.

7. A container for holding products therein during shipment, the container comprising:

a base and four walls;

four stationary corner supports, each corner support having a central portion and two side portions, the central portion and one side portion of the corner support being operatively coupled to adjacent walls of the four walls of the container;

multiple levels of dunnage for holding products during storage and shipment, at least one level of dunnage being stationary and at least one level of dunnage being at least partially movable to facilitate insertion and removal of products from an interior of the container; and

guides supported by the corner supports, the guides directing at least one dunnage component of a first level of dunnage to a desired position to facilitate removal or insertion of products into and out of a second level of dunnage.

8. The container of claim **7** wherein the first level of dunnage comprises two dunnage components, each of the dunnage components having at least one opening through the dunnage component which one of the guides passes such that the first dunnage component may be guided to a desired position.

9. The container of claim **7** wherein the second level of dunnage is stationary.

10. The container of claim **7** wherein at least one of the dunnage components includes a piece of foam.

11. The container of claim **7** wherein the guides are at least partially supported by the container.

12. The container of claim **7** wherein each of the dunnage components has notches for retaining products.

13. The container of claim **7** wherein each of the guides is supported on one end by a side structure of the container.

14. The container of claim **7** wherein the container has multiple levels of dunnage.

15. A container for holding products therein during shipment, the container comprising:

a base, a front, a rear and two opposed sides;

corner supports secured to the container, each of the corner supports being generally U-shaped in cross-section having a central portion and two side portions, the central portion being secured to one of the front and rear of the container and one side portion being secured to one of the opposed sides of the container;

guides supported by the corner supports;

upper and lower levels of dunnage for holding products during storage and shipment, the upper level of dunnage comprising two dunnage components, at least one

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of the dunnage components being movable between a first position and a second position, the dunnage components being closer together when said at least one of the dunnage components is in the first position, movement of the dunnage components of the upper level of dunnage towards each other being limited by the guides, the guides directing said at least one of the dunnage components of the upper level of dunnage to facilitate removal or insertion of products into and out of the lower level of dunnage.

16. The container of claim 15 wherein the lower level of dunnage is stationary.

17. The container of claim 15 wherein at least one of the dunnage components is made at least partially of foam.

18. The container of claim 15 wherein at least one of the dunnage components comprises multiple pieces.

19. The container of claim 15 wherein at least one of the dunnage components has a specific geometry for a particular product.

20. A container for holding products therein during shipment, the container comprising:

a base, a front, a rear and at least two opposed sides; four stationary corner supports, each stationary having a central portion and two side portions, the central portion being secured to one of the front and rear of the container and one of the side portions being secured to one of the opposed sides of the container; multiple levels of dunnage for holding products during storage and shipment, a bottom level of dunnage being stationary and an upper level of dunnage comprising a pair of dunnage components, at least one of the dunnage

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nage components being movable between a first position and a second position, the dunnage components being further apart when each movable dunnage component is in the second position for insertion and removal of parts from the bottom level of dunnage through an opening between the dunnage components, wherein each movable dunnage component moves between the side portions of the corner supports; and stationary guides at vertically spaced levels supported by the stationary corner supports, each of the stationary guides extending through openings in the side portions of the stationary corner supports for directing each movable dunnage component of the upper level of dunnage to a desired position to facilitate removal or insertion of products into and out of the bottom level of dunnage.

21. The container of claim 20 wherein each of the dunnage components of the upper level of dunnage has at least one opening through the dunnage component through which one of the stationary guides passes such that the upper dunnage component may be guided to a desired position.

22. The container of claim 20 wherein the bottom level of dunnage is secured to the container.

23. The container of claim 20 wherein at least one of the dunnage components includes a piece of foam.

24. The container of claim 20 wherein each of the dunnage components has notches for retaining products.

25. The container of claim 20 wherein the container has two levels of dunnage.

\* \* \* \* \*

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 9,481,489 B2  
APPLICATION NO. : 14/605175  
DATED : November 1, 2016  
INVENTOR(S) : Judson A. Bradford et al.

Page 1 of 3

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Specification

Column 1

Line 31, “parks” should be ---parts---.

Column 2

Line 30, “she” should be ---size---.

Line 40, “ma” should be ---may---.

Column 3

Line 37, “notches into” should be ---notches in---.

Line 44, “loving” should be ---moving---.

Column 4

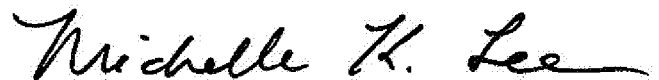
Line 36, delete the “,” after the word “dunnage”.

Line 43, “vies” should be ---view---.

Column 6

Line 56, “was 16” should be ---walls 16---.

Signed and Sealed this  
Seventh Day of February, 2017



Michelle K. Lee  
*Director of the United States Patent and Trademark Office*

Column 7

Line 17, “dun gage” should be ---dunnage---.

Line 58, “end moves” should be ---and moves---.

Column 8

Line 20, “aluminum steel” should be ---aluminum, steel---.

Line 37, “site” should be ---size---.

Column 9

Line 13, “shipment, to other words” should be ---shipment. In other words---.

Line 62, “illustrates” should be ---illustrate---.

Column 10

Line 21, “it” should be ---illustrate---.

Column 11

Line 17, “wide 40” should be ---guide 40---.

Line 23, “orated” should be ---located---.

Column 12

Line 13, “all” should be ---wall---.

Line 18, “was 16” should be ---walls 16---.

Column 14

Line 2, “was 174” should be ---walls 174---.

Line 24, insert the word --is-- in front of the word “true”.

Line 27, insert a --)-- after the word “10eee”.

Line 46, insert a --(-- before the first occurrence of the word “or”.

Column 14

Line 62, insert a --)-- after the word “10eee”.

Line 63, “pare lei” should be ---parallel---

Column 15

Line 13, “tending” should be ---extending---

Line 36, “as pair” should be ---a pair---

Column 17

Line 20, insert the word --is-- before the word “greater”.

Column 18

Line 25, “is thrown” should be ---is shown---

Column 20

Line 4, “are illustrated” should be ---is illustrated---

Column 21

Line 27, “support niece” should be ---support piece---

In the Claims

Column 22

Line 21, “corner supper” should be ---corner support---

Column 23

Line 23, “stationary having” should be ---stationary corner support having---